



STATE OF MAINE
MAINE REVENUE SERVICES

PT103

Valuation of Real Estate

Revised June, 2017

The Department of Administrative and Financial Services does not discriminate on the basis of disability in admission to, access to, or operation of its programs, services or activities. This material can be made available in alternate formats by contacting the Department's ADA Coordinator at (207) 624-8288 (voice) or 7-1-1 (V/TTY).

PHONE: (207) 624-5600 V/TTY: (207) 7-1-1 FAX: (207) 287-6396 EMAIL: prop.tax@maine.gov
www.maine.gov/revenue/propertytax

TABLE OF CONTENTS

FOREWORD	1
Chapter 1 INTRODUCTION – THE BASICS	
The Market Approach.....	4
The Income Approach.....	4
The Cost Approach	5
The Four Great Forces.....	6
Economic Principles of Valuation	7
Cost, Value, and Price.....	8
Data Collection.....	8
The Appraisal Process	10
Chapter 2 LAND VALUATION	
Developed Lots	11
Land Valuation Methods.....	11
Front Foot Value	12
Depth Factors.....	12
Depth Factors Table.....	13
Land Value Reference Sheet	15
Front Foot Value Method – Class Problems.....	16
Square Foot Value	42
Front and Rear Acre Valuation.....	42
Factors Affecting Land Valuation	43
Chapter 3 THE COST APPROACH	
The Cost Approach	45
Alternatives to Cost Schedules	45
Modular/Mobile Homes	46
Farm Properties	46
Commercial and Industrial Properties	47
Steps in the Cost Approach.....	48
Use of Cost Schedules.....	48
Current Cost Factor.....	50
Ten Components of Structure	50
Summary of Grade Requirements.....	51
Inspecting, Measuring, and Listing a Building	51
Suggested Abbreviations	53
Story Height Determination	54
Garages and Outbuildings.....	55
Pricing and Cost Schedule Structure	55
Sample Appraisals	56
Appraisal Problems	56

Chapter 4 DEPRECIATION AND OBSOLESCENCE

Depreciation and Condition	57
Direct Method of Depreciation	58
Physical Deterioration	58
Functional Obsolescence	59
Economic Obsolescence	60

Chapter 5 MARKET APPROACH

Procedure	64
Comparative Market Analysis	64
Class Problem	68

Chapter 6 INCOME APPROACH

Definitions	72
Income	73
Capitalization	75
Steps in the Direct Capitalization Process	75
Determining the Capitalization Rate	76
Calculating Value	77
Class Problems	79

Chapter 7 SALES RATIO STUDIES

Introduction	83
Verification of Data	83
Time Period for Sales	84
Definitions	85
Ratio Study Problems	88

ANSWERS TO CLASS PROBLEMS

Chapter 2 answers	99
Chapter 5 answers	133
Chapter 6 answers	135
Chapter 7 answers	139

FOREWORD

This is the final course in a series of three introductory courses offered by the Maine Property Tax Division as part of the state's training and certification program for property taxation. This course text represents an ongoing commitment to provide education and training for assessors and those who wish to become assessors. 36 M.R.S. § 318 states, in part:

The State Tax Assessor may establish, either on the assessor's own initiative or in conjunction with professional or educational agencies, or both, a program of training to meet the needs of the State of Maine for a sufficient supply of competently trained assessors.

The material contained in this text is designed to be an introduction to generally accepted practices for valuation of residential property, which dominates the property tax base in most Maine municipalities. This course material is used in combination with the *State of Maine Assessment Manual* for the introductory course PT103.

Chapter 1

INTRODUCTION – THE BASICS

The purpose of this text is to introduce the three approaches to valuation of property for tax assessment purposes, the market approach, the income approach, and the cost approach. All three approaches lead to estimates of market value (also referred to as “current market value”) for property within a municipality. This text emphasizes the cost approach.

Assessors are required to value all property within their municipalities. The Maine Constitution requires a “general valuation” at least once every ten years. This requirement does not mean a municipality must contract with a valuation company to do a complete municipal revaluation, but an occasional revaluation can be a valuable tool for maintaining just value throughout a municipality.

Almost all property is subject to competing uses. When estimating market value, the assessor must determine which of the competing uses is the highest and best. Highest and best use is the legally allowable use that will generate the highest return to the property over time. The highest and best use of any property must meet the following four criteria.

1. Physically possible and probable
2. Legally permissible
3. Financially feasible
4. Most productive (either income generated for a business or available amenities for an individual)

The goal of any valuation procedure is to establish just value. Just value does not always mean market value, although the two terms are directly related. Market value is the price a willing buyer will pay for a property offered by a willing seller, with no additional influences such as the need to sell quickly or the buyer and seller being related to each other. Just value means that a property is valued based on market value. Just value can be equal to, greater than, or less than market value, as long as all other properties in the municipality are valued at the same relation to market value. For example, if a property is assessed at 85% of market value, that property is assessed at just value if all property in that municipality is also assessed at 85% of market value.

The definition of market value as adopted by the Appraisal Institute and the International Association of Assessing Officers (IAAO) is as follows:

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- A. Buyer and seller are typically motivated;*
- B. Both parties are well informed or well advised and acting in what they consider their best interests;*
- C. A reasonable time is allowed for exposure to the open market*
- D. Payment is made in terms of cash in U.S. dollars;*
- E. And the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.*

The Market Approach

The market approach to valuation creates an estimate of property value based on recent property sales in a municipality. These recent sales are combined into an analysis called a ratio study. A sufficient number of sales are required to conduct a proper ratio study. The Maine Property Tax Division generally requires at least 12 sales to conduct a ratio study (see Maine Revenue Services Rule 201, § 03(B)(1)). A qualified analysis of sales, rather than an opinion, is the best support for defending an estimate of value.

The market approach is the method most often employed by independent appraisers for purposes of determining value for one parcel of land and all the buildings on it (single property appraisal). Assessors use this approach to verify the cost approach to valuation by comparing a few comparable sales to the subject property. This method is the one most frequently used in an appeal of assessed valuation. An estimate of value for the subject property is determined by adjusting the selling price of a property closely matching the subject.

The Income Approach

The income approach to valuation creates an estimate of value based on the future income potential of a property. There are three major components in the formula used in the income approach. They are income, (capitalization) rate and value. The formula is often referred to as the "IRV" formula.

$$\text{Income/Rate} = \text{Value}$$

Alternately, $\text{Income/Value} = \text{Rate}$ or $\text{Value} \times \text{Rate} = \text{Income}$

The Cost Approach

The cost approach to valuation is the primary method assessors use to arrive at an estimate of value for the purposes of mass appraisal. Mass appraisal, unlike single property appraisal, is the valuation of many properties, such as all property in a municipality, using a uniform technique. This uniform technique must be broad enough to apply to all the different types of property in a municipality (residential, commercial, industrial, agricultural, etc.). The cost approach is based on several appraisal principles.

The cost approach is designed to arrive at the cost of replacing a structure for the same use rather than creating an exact duplicate of that structure. For example, consider a Victorian era home. In most cases, a home is constructed according to current standards and building codes, using modern materials. It is probably not built with the same materials or to the same standards in existence when the original was built. Most likely, it will not have tin ceilings, or a stone foundation, or the novelty, decorative trim on the outside. When properly applied, the cost approach should return a value estimate of a home with similar usable space and of comparable quality.

The cost approach will usually set the upper limit of value. The cost to construct a building should not exceed what it would cost to purchase an existing, similar building.

For example, you must value a 3,000 square foot ranch on a standard lot. A builder will construct this type of house for \$100 per square foot, or \$300,000. Add to this the cost of land, for this example, \$50,000 and necessary site improvements (access to water, sewer and electricity), \$30,000. The costs together will approximate the market value of the property, or about \$380,000.

This concept is fine if you have to value new buildings. For older property, the cost approach applies depreciation to the replacement cost to determine value.

Current appraisal technology is a marriage between the cost approach and the market approach.

Cost data estimates basic cost, while the market approach is used to determine the amount lost due to physical wear and tear or obsolescence (both functional and economic). The market approach is also the foundation for any market-based adjustments to the cost schedule. This combination of both the cost approach and the market approach is sometimes referred to as the “market-adjusted cost approach.”

The cost approach forms the basis for determining the replacement cost new (RCN) of a structure. Older structures however, must have the RCN adjusted downward to represent value lost due to wear and tear, lack of functionality or value lost because of location influences – replacement cost new less depreciation and obsolescence

(physical and functional). The shorthand name is replacement cost new less depreciation or, RCN-D.

The Four Great Forces

Four general forces affect the market value of property. These forces – called the Four Great Forces – are called Physical, Economic, Governmental, and Social. The following are examples of the Four Great Forces (also referred to as P.E.G.S). Each of these forces can affect the value of property either adversely or positively.

1. Physical forces:

- a. Topography
- b. Lot shape, soil conditions
- c. Access to services, i.e., parks, stores, employment, schools, churches, transportation

Topography of a sharp, steep nature may be desirable if the buyer is looking for deep water frontage on a water body; however, a homeowner may be reluctant to pay a great deal of money for a property if the driveway has a 45 degree slope.

2. Economic forces:

- a. Income trends
- b. Lending policies and interest rates
- c. Construction costs
- d. Housing prices and rental rates
- e. Availability of vacant land

A solitary manufacturing plant layoff can decimate a rural municipality.

3. Governmental forces:

- a. Zoning
- b. Building codes
- c. Municipal services
- d. Taxes

Governmental forces play a large role in the development of property. Subdivision or shoreland zoning regulations can have a profound effect on value. Property value is often enhanced as a result of zoning laws that prevent sprawl and may be reduced if police or fire protection is cut back.

4. Social forces:

- a. Population trends, age distribution
- b. Family size
- c. Education trends
- d. Crime rates

There are times when social forces may be paramount in the buying process. For instance, the family with teenage children may desire to live near the area high school, while a retired couple might prefer a golf course or library.

Economic Principles of Valuation

The following economic principles work in concert with the Four Great Forces in the development and evolution of property markets and value.

The principle of **anticipation** says that market value is the present worth of all anticipated future benefits derived from the property. Those benefits must be either income or amenities. The assessor should not allow personal opinion to influence the determination of anticipated future benefits. This is difficult to determine because of the principle of change.

The principle of **balance** says that market value is maximized when the four agents of production (land, labor, capital, and management) attain a state of equilibrium. When applied to a neighborhood, this means that the value of a property is at its peak when the neighborhood has all of the services it needs. Value is reduced if there are too few or too many services in a neighborhood.

The principle of **change** says that the market is never constant, because physical, economic, government, and social (PEGS) forces are always at work to change the property.

The principle of **competition** says that competition is created when the potential for profit, or the existence of new amenities attracts new sellers and buyers to a market. An excess of one type of property will tend to decrease the value of other properties.

The principle of **conformity** says that maximum market value is achieved when there is reasonable similarity among the improvements (houses and other additions to the land) in a neighborhood, and when the residents have similar ages, incomes, education, attitudes, etc.

The principle of **consistent use** says that property must be valued with a single use for the entire property. It is improper to value a property on a basis of one use for the land and another use or uses for the improvements.

The principle of **contribution** says that the value of one component of a property depends on its contribution to the whole. For example, a residential homeowner spends \$12,000 to erect a garage. The market value of his property is only increased by \$7,500. In this case, \$7,500 is the value contribution of the garage.

The principle of **increasing and decreasing returns** says that additional investment in a property will increase the return up to a certain point, and then, beyond this point, the return on additional capital decreases.

The principle of **progression and regression** says that the value of lower priced properties may be increased by proximity to better properties of the same type. Likewise, a better quality property will decrease in value by proximity to lower quality properties in the same area.

The principle of **substitution** says that the market value of a property tends to be set by the cost of acquiring an equally desirable and valuable substitute property. This is the principle that underlies the three approaches to value (cost, market, and income).

The principle of **supply and demand** says that the price of a property increases with increased demand and decreases with increased supply. Conversely, the price of a property decreases with decreased demand (recession) and increases with a limitation on supply (a building moratorium).

The principle of **surplus productivity** relates to the income remaining after the costs of labor, capital, and management have been paid.

Cost, Value, and Price

Cost is not always value, and value is not always cost; and the price paid may not represent value or cost.

Value is defined as the importance or usefulness of an item. Value is sometimes referred to as the present worth of future benefits. Value is what a well-informed, intelligent buyer, acting voluntarily, and without necessity will pay for a property. Value can be measured by productivity – the net return in utility, satisfaction, or dollars.

Cost is the summary of expenditures necessary to create something.

Price is the goods or commodities asked or paid for other goods and commodities.

Therefore, the value of a property may be the sum of its costs. It may be represented by the price paid for the property. Yet, the value of a property may not be either cost or price. Ultimately, value is set by the marketplace.

Data Collection

All three approaches to valuation are dependent on data. There are several different types of data necessary for each approach. All data collected must be current, to reflect market value.

Some sources of data are:

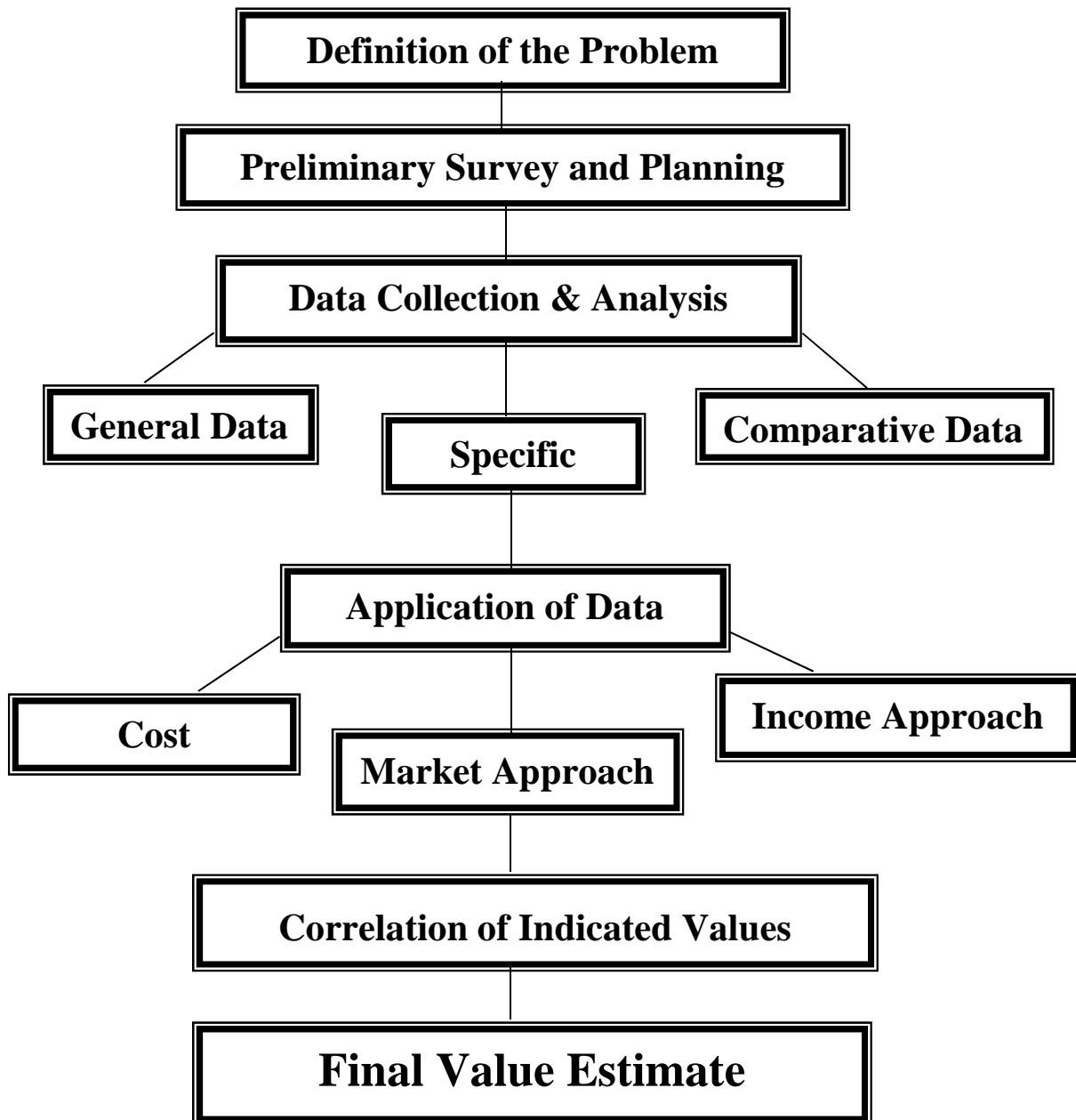
- Declaration of value forms – Real Estate Transfer Tax forms
- Deeds
- Mortgages
- Newspaper advertisements (asking prices – not sales prices)
- Realtors
- Banks
- Real estate trade magazines and periodicals
- Property owners who have bought and sold property (Sales Qualification)
- Contractors
- Commercial cost schedules
- Field reviews

Once the data has been collected, it must be analyzed in as many ways as possible to determine any effect on market value. Property type, locations, services provided, and quality are just some of the types of analyses to be performed. It is important to determine how these different property characteristics affect the market value of property. These studies vary depending on the types of property in your jurisdiction.

Data on the specific properties to be appraised must be collected. This involves a program of uniformly measuring and listing characteristics of each property to allow for the consistent application of pricing units and formulas. A specially designed data collection form needs to be completed for each property. This information is then transferred to a property record card listing the details of the structure, other improvements, land and parcel background along with the determination of value data.

These data cards are related to a geographic locator on a map or grid. Most Maine jurisdictions use tax maps. Cards on each specific property are ordered by the map, lot and or block number of its location. This land-based system is the most secure, as property, generally speaking, does not move. A coordinate on the face of the earth is for the most part, stationary and will always provide an accurate reference to location.

The Appraisal Process



CHAPTER 2

LAND VALUATION

The valuation of land involves the combination of the market approach and the cost approach. The value of land can be determined through analysis of land sales. Since sales of land only are sometimes rare, land may also be valued by subtracting the value of improvements from the sale price of improved property. The costs to improve land are determined through construction cost schedules. This method of extracting land value from total parcel selling price is called a land residual calculation.

For commercial and industrial property, it is possible to capitalize the income attributed to land. This technique will be discussed in Chapter 6, The Income Approach.

Developed Lots

A lot, to be classified as developed, must have significant improvements. The fact that a lot has a building on it does not, by itself, make the lot developed. Items to consider when determining whether a lot is developed include a dependable water supply, a functioning septic system, landscaping, and an acceptable driveway (usually gravel or paved).

The most important aspects of a developed lot are the water supply and the septic system. A spring or shallow dug well without a septic system would normally not justify a developed parcel. It is possible to have a developed lot without water or septic, but that is a rare situation involving extensive improvements to the land otherwise.

Land Valuation Methods

The State of Maine requires assessors to determine and report land values separately from the value of improvements (buildings and other items affixed to land). There are certain tools and procedures available to enable this process.

Tax maps are the first tool used in the valuation of land. Sales of land supply the necessary underlying valuation data. Plotting land sales on maps helps visualize the array of values throughout the jurisdiction. A site inspection verifies the use of the property and any improvements.

Establishing a land pricing schedule helps establish equitable land values throughout the jurisdiction. These schedules are developed from local land sales. Types of pricing schedules include front foot valuation, square foot valuation, and rear acre valuation.

Front Foot Value

This method establishes the value of one foot of frontage – usually on a road or a body of water – with a parcel depth equal to a standard size lot for the area. This value is called the front foot value. Depth factors adjust the front foot value for differing parcel depths, so that one front foot of a parcel shallower than the standard depth is valued less than the standard amount. Conversely, one front foot of a parcel deeper than standard will be valued at more than the standard rate by applying a depth factor. The front foot value multiplied by the depth factor is called the adjusted front foot value. Depth factors can be arranged in a table, such as the one on the following page.

Depth Factors

The adjusted front foot value of a parcel twice as deep as standard is ordinarily less than twice the standard front foot value. The front foot value of a parcel half as deep as standard is ordinarily more than half the standard value. As a result, the calculation of depth factors is usually not a straight correlation. The depth factor calculation used in this text is equal to the square root of the subject lot depth divided by the standard lot depth, or:

$$\text{Depth Factor} = \sqrt{(\text{parcel depth}/\text{standard depth})}$$

Where “parcel depth” is the depth of the subject lot and “standard depth” is the depth of a standard lot. For example, the depth factor calculation for a lot that is 125 feet deep in a neighborhood where the standard lot depth is 100 feet is:

$$DF = \sqrt{(125/100)} = \sqrt{1.25} = 1.12$$

If the subject lot depth is equal to the standard depth, the depth factor will be 1.00.

Depth Factor Table

The following table of percentage factors is designed to give a uniform method of adjusting the value per front foot, up or down, depending on whether the lot is more or less than the standard depth.

Depth In Feet	Factor 100 Ft. Standard	Factor 125 Ft. Standard	Factor 150 Ft. Standard	Factor 200 Ft. Standard	Factor 220 Ft. Standard	Factor 250 Ft. Standard
10	0.32	0.28	0.26	0.22	0.21	0.20
15	0.39	0.35	0.32	0.27	0.26	0.24
20	0.45	0.40	0.37	0.32	0.30	0.28
25	0.50	0.45	0.41	0.35	0.34	0.32
30	0.55	0.49	0.45	0.39	0.37	0.35
35	0.59	0.53	0.48	0.42	0.40	0.37
40	0.63	0.57	0.52	0.45	0.43	0.40
45	0.67	0.60	0.55	0.47	0.45	0.42
50	0.71	0.63	0.58	0.50	0.48	0.45
55	0.74	0.66	0.61	0.52	0.50	0.47
60	0.77	0.69	0.63	0.55	0.52	0.49
65	0.81	0.72	0.66	0.57	0.54	0.51
70	0.84	0.75	0.68	0.59	0.56	0.53
75	0.87	0.77	0.71	0.61	0.58	0.55
80	0.89	0.80	0.73	0.63	0.60	0.57
85	0.92	0.82	0.75	0.65	0.62	0.58
90	0.95	0.85	0.77	0.67	0.64	0.60
95	0.97	0.87	0.80	0.69	0.66	0.62
100	1.00	0.89	0.82	0.71	0.67	0.63
105	1.02	0.92	0.84	0.72	0.69	0.65
110	1.05	0.94	0.86	0.74	0.71	0.66
115	1.07	0.96	0.88	0.76	0.72	0.68
120	1.10	0.98	0.89	0.77	0.74	0.69
125	1.12	1.00	0.91	0.79	0.75	0.71
130	1.14	1.02	0.93	0.81	0.77	0.72
135	1.16	1.04	0.95	0.82	0.78	0.73
140	1.18	1.06	0.97	0.84	0.80	0.75
145	1.20	1.08	0.98	0.85	0.81	0.76
150	1.22	1.10	1.00	0.87	0.83	0.77
160	1.26	1.13	1.03	0.89	0.85	0.80
170	1.30	1.17	1.06	0.92	0.88	0.82
180	1.34	1.20	1.10	0.95	0.90	0.85
190	1.38	1.23	1.13	0.97	0.93	0.87
200	1.41	1.26	1.15	1.00	0.95	0.89
210	1.45	1.30	1.18	1.02	0.98	0.92
220	1.48	1.33	1.21	1.05	1.00	0.94
230	1.52	1.36	1.24	1.07	1.02	0.96
240	1.55	1.39	1.26	1.10	1.04	0.98
250	1.58	1.41	1.29	1.12	1.07	1.00
300	1.73	1.55	1.41	1.22	1.12	1.05
350	1.87	1.67	1.53	1.32	1.17	1.10
400	2.00	1.79	1.63	1.41	1.22	1.14
450	2.12	1.90	1.73	1.50	1.43	1.18
500	2.24	2.00	1.83	1.58	1.51	1.22

To calculate the value of a parcel using the front foot value method, you must perform three steps:

- 1) determine or calculate the depth factor (DF);
- 2) calculate the adjusted front foot value (ADJ FFV); and
- 3) calculate the parcel value.

To calculate the depth factor, use the depth factor equation from above.

$$1) DF = \sqrt{\text{parcel depth/standard depth}}$$

To calculate the adjusted front foot value, multiply the front foot value (FFV) by the depth factor for the parcel.

$$2) ADJ FFV = FFV \times DF$$

To calculate the parcel value, multiply the adjusted front foot value by the number of frontage (or front) feet (FF) for the parcel.

$$3) \text{ Parcel Value} = ADJ FFV \times FF$$

You can combine these three steps into a single equation:

$$\text{Parcel Value} = (FFV \times \sqrt{\text{parcel depth/standard depth}}) \times FF$$

You may have a depth factor table available to use, which will simplify this equation to:

$$\text{Parcel Value} = FFV \times DF \text{ (from table)} \times FF$$

Land Value Reference Sheet

FFV = Front Foot Value

DF = Depth Factor = $\sqrt{\text{parcel depth/standard depth}}$

FF = Number of Front Feet

TF = Triangle Factor = 0.60 for delta triangle (base on street); 0.30 for nabla triangle (point on street)

ML = Merge Line



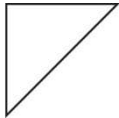
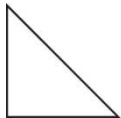
Rectangular Parcel

$$\text{Value} = (\text{FFV} \times \text{DF}) \times \text{FF}$$



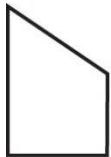
Rear Rectangular Parcel

$$\text{Value} = (\text{FFV} \times \text{DF}) \times \text{FF}, \text{ where } \text{DF} = \text{DF}_{\text{TOTAL AREA}} - \text{DF}_{\text{FRONT PARCEL}}$$



Triangular Parcel

$$\text{Value} = (\text{FFV} \times \text{DF}) \times \text{FF} \times \text{TF}$$



Trapezoidal Parcel

1) Both sides perpendicular to street:

$$\text{Value} = (\text{FFV} \times \text{DF}) \times \text{FF}, \text{ where DF is based on average depth}$$



2) One side at an oblique angle to street:

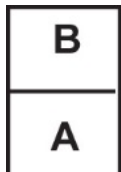
Split into rectangular parcel and triangular parcel

$$\text{Value} = \text{Value}_{\text{RECTANGLE}} + \text{Value}_{\text{TRIANGLE}}$$



Parallelogram Parcel

$$\text{Value} = (\text{FFV} \times \text{DF}) \times \text{FF}, \text{ where DF is based on perpendicular depth}$$



Parcel with Frontage on Two Streets

$$\text{ML}_A = \text{FFV}_A \times (\text{parcel depth}/(\text{FFV}_A + \text{FFV}_B))$$

$$\text{ML}_B = \text{parcel depth} - \text{ML}_A$$

Value as two separate rectangular parcels from street to ML

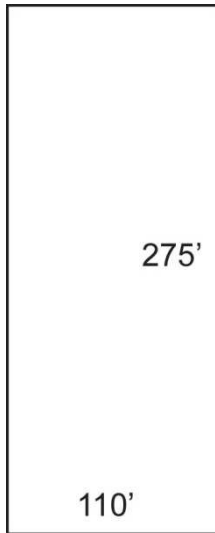
Front Foot Value Method – Class Problems

Answers on page 137

Valuation of Rectangular Parcels

To calculate the value of a rectangular parcel, follow the three front foot value method steps and round the answer to the nearest \$100.

Example 2.1: Standard depth = 220ft; FFV = \$350/ft



$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(275\text{ft}/220\text{ft})} = \sqrt{1.22} = 1.12 \end{aligned}$$

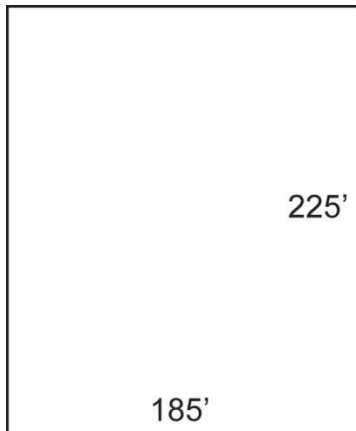
$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$350/\text{ft} \times 1.12 = \$392/\text{ft}$$

$$3) \text{ Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$392/\text{ft} \times 110\text{ft} = \$43,120$$

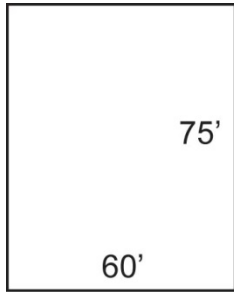
rounded to \$43,100

Calculate the value for each of the parcels below. Assume the street frontage is at the bottom of each diagram.

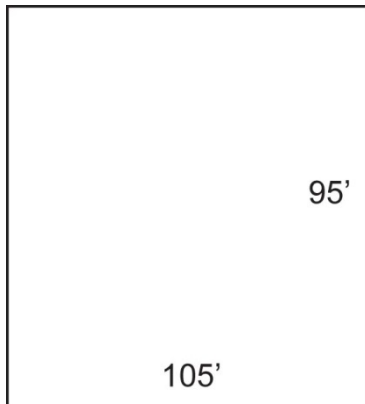
Example 2.2: Standard depth = 220ft; FFV = \$350/ft



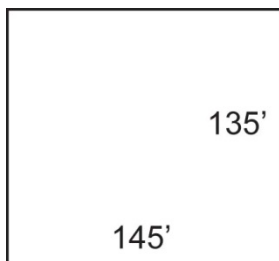
Example 2.3: Standard depth = 150ft; FFV = \$225/ft



Example 2.4: Standard depth = 250ft; FFV = \$425/ft



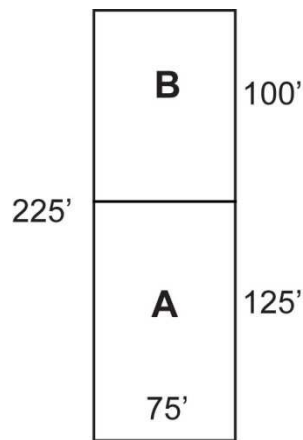
Example 2.5: Standard depth = 125ft; FFV = \$150/ft



Valuation of Rear Rectangular Parcels

The valuation of a rear rectangular parcel follows the same three step process as with rectangular parcels, but with one additional step. Rather than calculating one depth factor, we have to calculate two depth factors and use the difference between the two in the rear parcel valuation. The two depth factors to calculate are: 1) for the entire property; and 2) for the front parcel. The depth factor for the entire property (DF_{A+B}) less the depth factor for the front parcel (DF_A) equals the depth factor for the rear parcel (DF_B).

Example 2.6: Standard depth = 200ft; FFV = \$300/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})}$$

$$= \sqrt{(225\text{ft}/200\text{ft})} = \sqrt{1.13} = 1.06$$

$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})}$$

$$= \sqrt{(125\text{ft}/200\text{ft})} = \sqrt{0.63} = 0.79$$

$$DF_B = 1.06 - 0.79 = 0.27$$

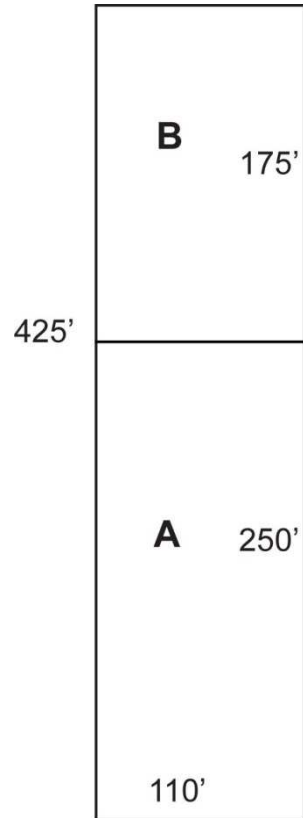
$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$300/\text{ft} \times 0.27 = \$81/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$81/\text{ft} \times 75\text{ft} = \$6,075$$

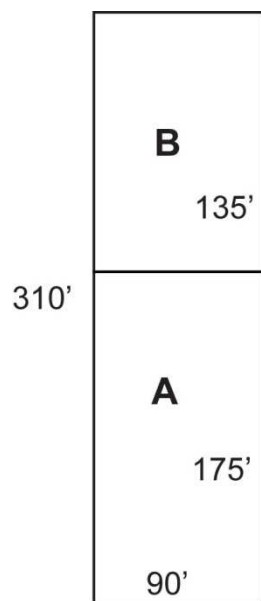
rounded to \$6,100

Calculate the value for parcel B for each of the properties below. Assume the street frontage is at the bottom of each diagram.

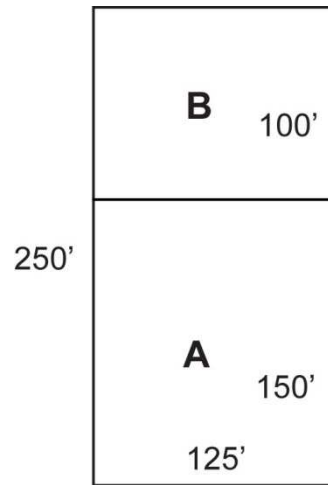
Example 2.7: Standard depth = 220ft; FFV = \$175/ft



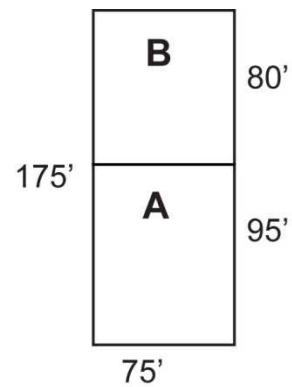
Example 2.8: Standard depth = 150ft; FFV = \$175/ft



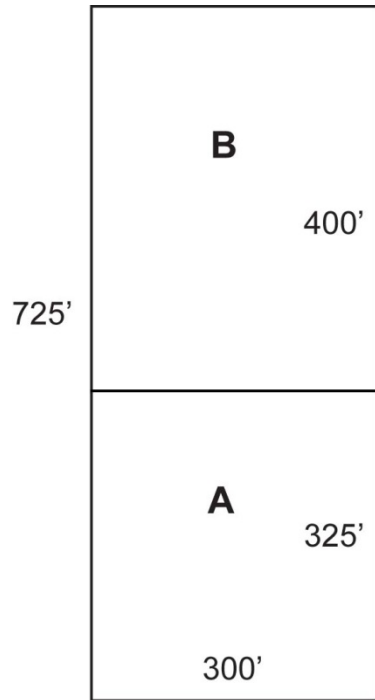
Example 2.9: Standard depth = 125ft; FFV = \$275/ft



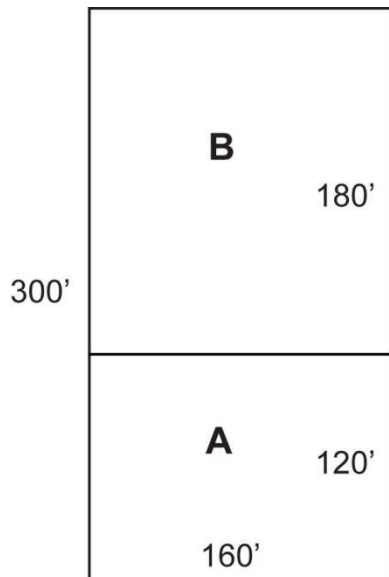
Example 2.10: Standard depth = 100ft; FFV = \$150/ft



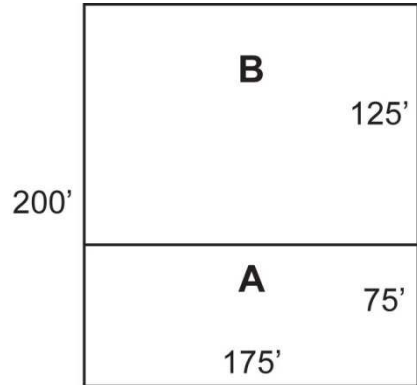
Example 2.11: Standard depth = 150ft; FFV = \$225/ft



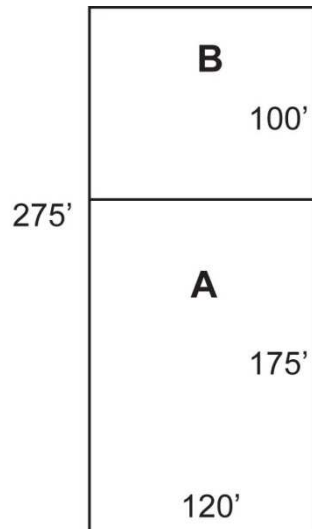
Example 2.12: Standard depth = 125ft; FFV = \$150/ft



Example 2.13: Standard depth = 200ft; FFV = \$175/ft



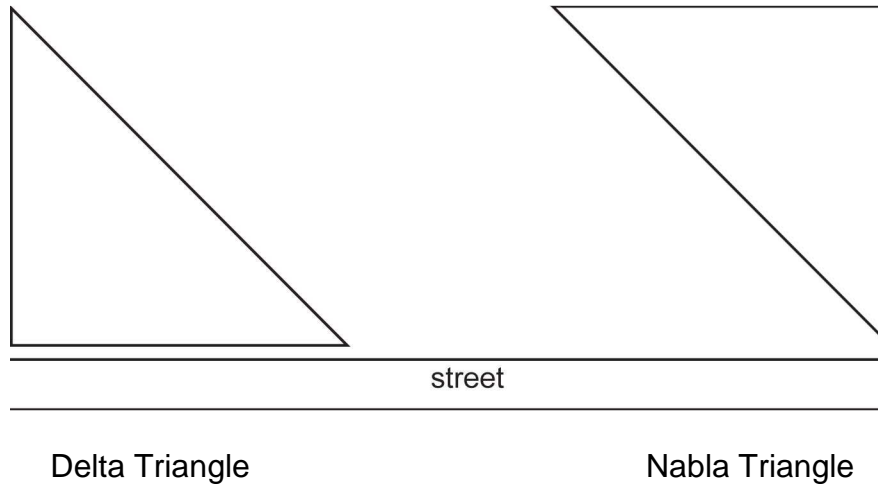
Example 2.14: Standard depth = 125ft; FFV = \$90/ft



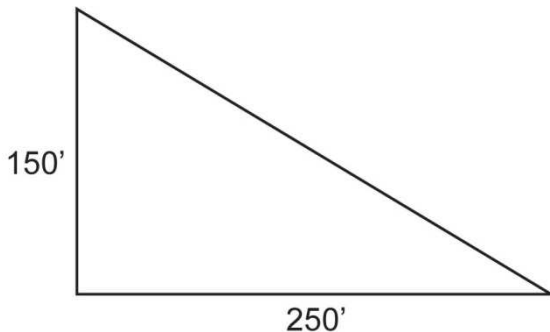
Valuation of Triangular Parcels

The valuation of a triangular parcel follows the same three step process as with rectangular parcels, but with one additional step. The parcel value calculation in step three requires the application of a multiplier, called a “triangular factor.” The triangular factor is either 0.60 or 0.30, depending on the orientation of the parcel with the street.

A triangular parcel with its wide end abutting the street is called a “delta triangle” and has a triangle factor of 0.60 (TF_D). A triangular parcel with its narrow end abutting the street is called a “nabla triangle” and has a triangle factor of 0.30 (TF_N).



Example 2.15: Standard depth = 125ft; FFV = \$350/ft



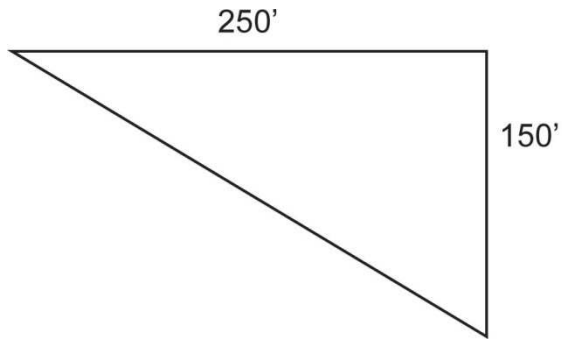
$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(150\text{ft}/125\text{ft})} = \sqrt{1.20} = 1.10$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$350/\text{ft} \times 1.10 = \$385/\text{ft}$$

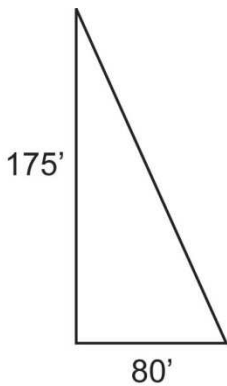
$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times TF_D = \\ \$385/\text{ft} \times 250\text{ft} \times 0.60 = \$57,750 \text{ rounded to } \underline{\underline{\$57,800}}$$

Calculate the parcel value for each of the properties below. Assume the street frontage is at the bottom of each diagram.

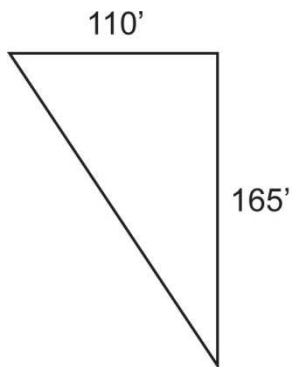
Example 2.16: Standard depth = 125ft; FFV = \$350/ft



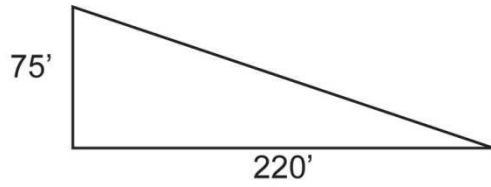
Example 2.17: Standard depth = 125ft; FFV = \$325/ft



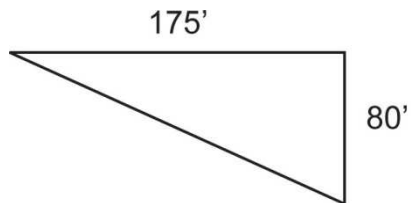
Example 2.18: Standard depth = 125ft; FFV = \$325/ft



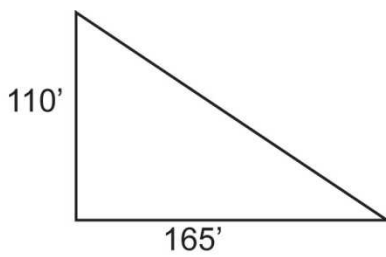
Example 2.19: Standard depth = 125ft; FFV = \$325/ft



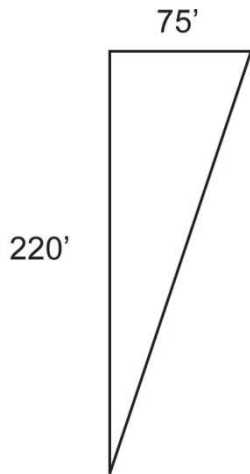
Example 2.20: Standard depth = 200ft; FFV = \$450/ft



Example 2.21: Standard depth = 200ft; FFV = \$450/ft

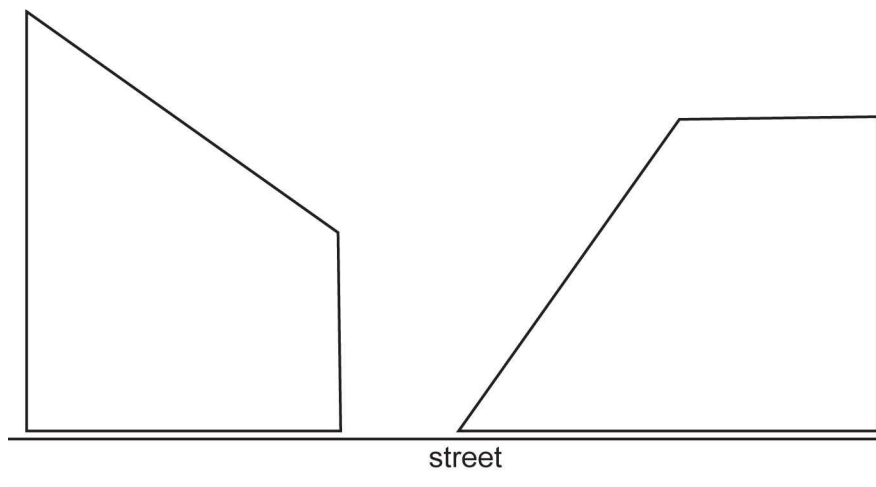


Example 2.22: Standard depth = 200ft; FFV = \$450/ft



Valuation of Trapezoidal Parcels

Trapezoidal parcels can be oriented at right angles to the street (or other frontage) or an oblique angle to the street.

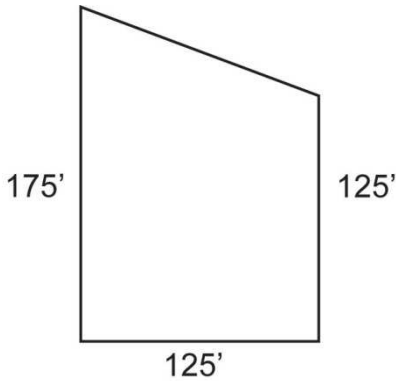


Trapezoid at right angles

Trapezoid at an oblique angle

The valuation of a trapezoidal parcel at right angles to the street follows the same three step process as with rectangular parcels, but with one additional step. The parcel depth is equal to the average depth of the parcel. To calculate the average depth, add the long side depth and the short side depth and divide the total by two. The average depth is used in the same three step calculation as with a rectangular parcel.

Example 2.23: Standard depth = 125ft; FFV = \$200/ft



$$\text{Average depth} = (175\text{ft} + 125\text{ft})/2 = 300\text{ft}/2 = 150\text{ft}$$

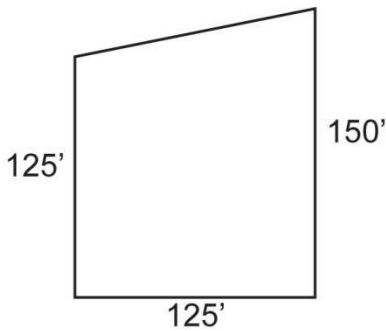
$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(150\text{ft}/125\text{ft})} = \sqrt{1.20} = 1.10 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$200/\text{ft} \times 1.10 = \$220/\text{ft}$$

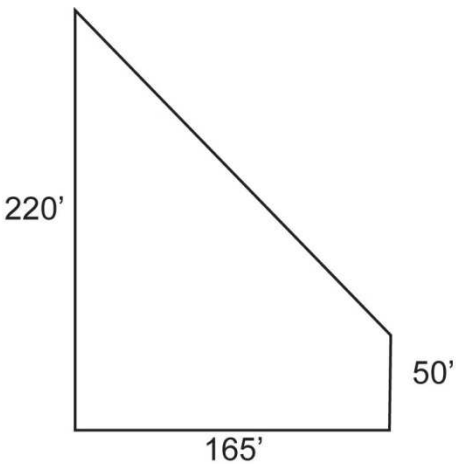
$$3) \text{ Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$220/\text{ft} \times 125\text{ft} = \underline{\underline{\$27,500}}$$

Calculate the parcel value for each of the properties below. Assume the street frontage is at the bottom of each diagram.

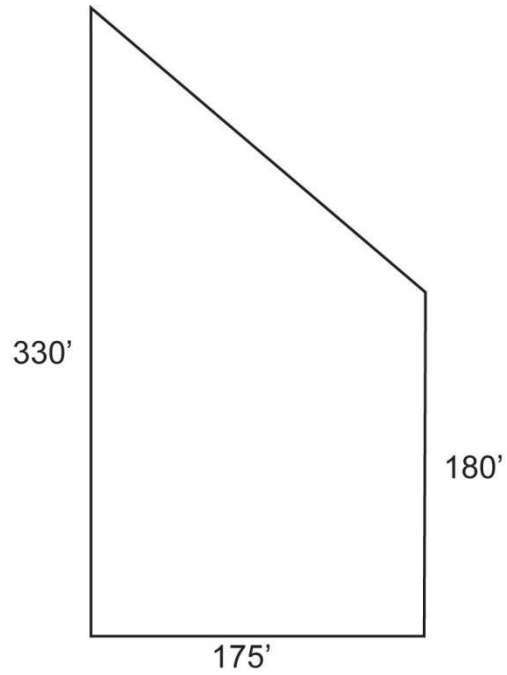
Example 2.24: Standard depth = 125ft; FFV = \$200/ft



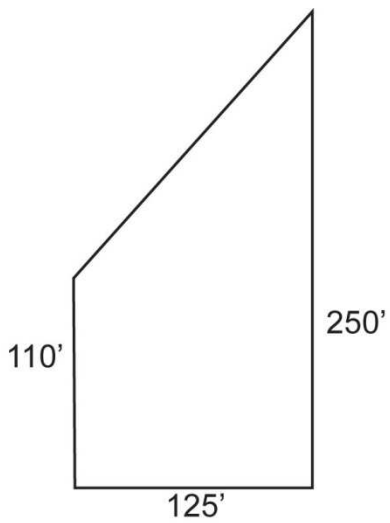
Example 2.25: Standard depth = 150ft; FFV = \$325/ft



Example 2.26: Standard depth = 200ft; FFV = \$400/ft

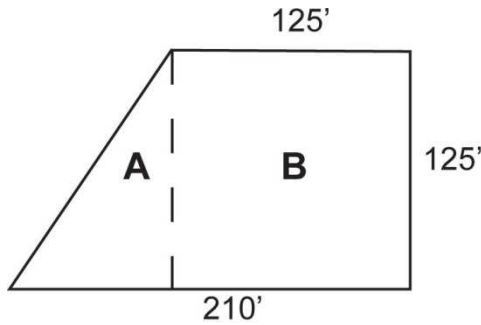


Example 2.27: Standard depth = 100ft; FFV = \$225/ft



The valuation of a trapezoidal parcel at an oblique angle to the street requires two separate parcel valuations, one for the rectangular portion and the other for the triangular portion. The total parcel valuation is the sum of these two separate calculations.

Example 2.28: Standard depth = 125ft; FFV = \$200/ft



$$1) DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(125\text{ft}/125\text{ft})} = \sqrt{1.00} = 1.00$$

$$2) \text{ADJ FFV}_A = \text{FFV} \times DF_A = \$200/\text{ft} \times 1.00 = \$200/\text{ft}$$

$$3) \text{Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_D = \$200/\text{ft} \times (210\text{ft} - 125\text{ft}) \times 0.60 = \$200/\text{ft} \times 85\text{ft} \times 0.60 = \underline{\$10,200}$$

$$1) DF_B = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(125\text{ft}/125\text{ft})} = \sqrt{1.00} = 1.00$$

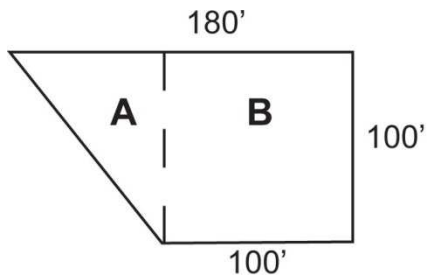
$$2) \text{ADJ FFV}_B = \text{FFV} \times DF_B = \$200/\text{ft} \times 1.00 = \$200/\text{ft}$$

$$3) \text{Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$200/\text{ft} \times 125\text{ft} = \underline{\$25,000}$$

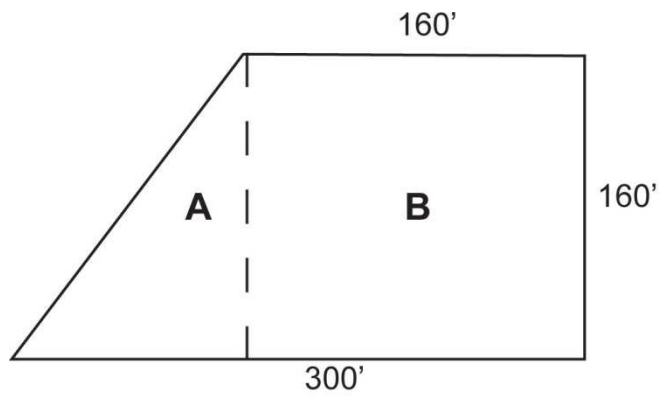
$$\text{Parcel Value} = \text{Value}_A + \text{Value}_B = \$10,200 + \$25,000 = \underline{\$35,200}$$

Calculate the parcel value for each of the properties below. Assume the street frontage is at the bottom of each diagram.

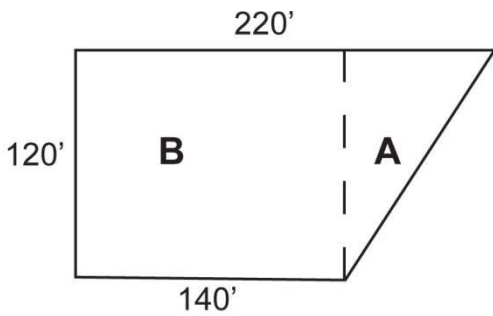
Example 2.29: Standard depth = 125ft; FFV = \$240/ft



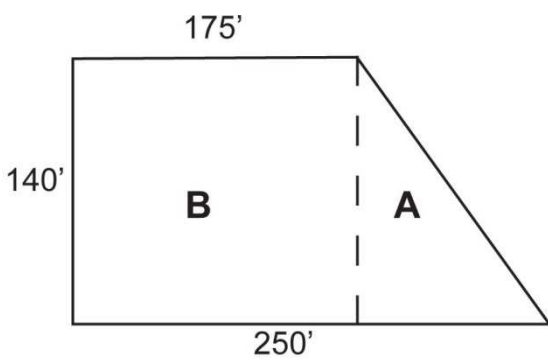
Example 2.30: Standard depth = 150ft; FFV = \$360/ft



Example 2.31: Standard depth = 125ft; FFV = \$250/ft



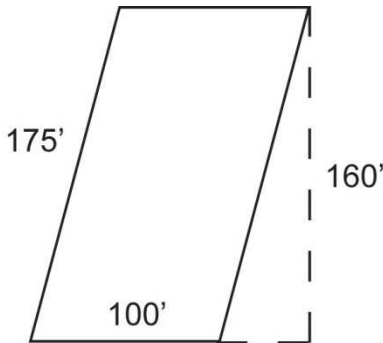
Example 2.32: Standard depth = 100ft; FFV = \$425/ft



Valuation of Parallelogram Parcels

The valuation of a parallelogram parcel follows the same three step process as with rectangular parcels, except that the depth factor is based on the perpendicular depth of the parcel.

Example 2.33: Standard depth = 150ft; FFV = \$100/ft



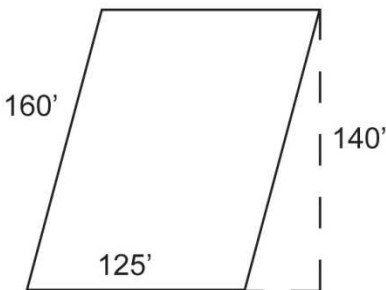
$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(160\text{ft}/150\text{ft})} = \sqrt{1.07} = 1.03$$

$$2) \text{ADJ FFV} = \text{FFV} \times \text{DF} = \$100/\text{ft} \times 1.03 = \$103/\text{ft}$$

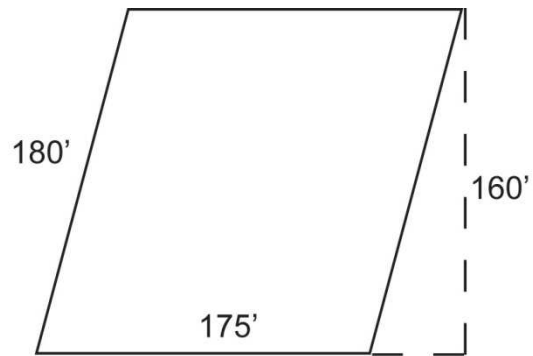
$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$103/\text{ft} \times 100\text{ft} \\ = \underline{\underline{\$10,300}}$$

Calculate the parcel value for each of the properties below. Assume the street frontage is at the bottom of each diagram.

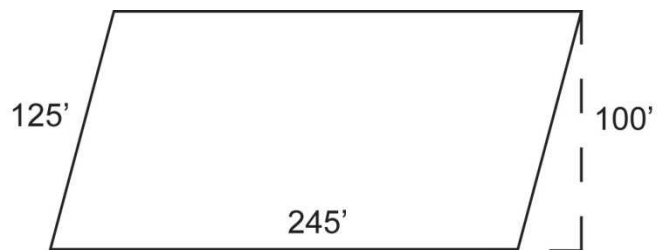
Example 2.34: Standard depth = 125ft; FFV = \$330/ft



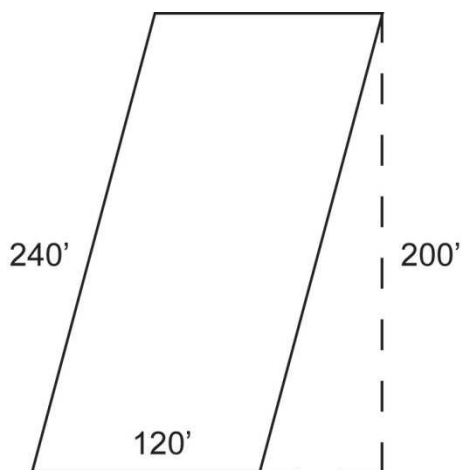
Example 2.35: Standard depth = 200ft; FFV = \$450/ft



Example 2.36: Standard depth = 150ft; FFV = \$250/ft



Example 2.37: Standard depth = 100ft; FFV = \$150/ft



Valuation of Parcels with Frontage on Two Streets

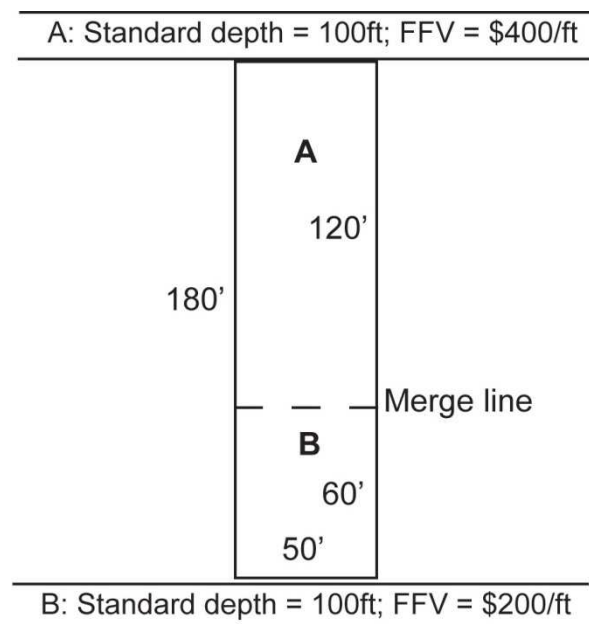
Commonly known as through-lots, parcels with frontage on two streets are primarily found in business or commercial areas. This valuation is also applicable in those residential areas where the back frontage is adapted and adaptable for house lots of sufficient size and would comply with building and zoning codes and ordinances.

If the through-lot is not of a sufficient depth to compute value on each street, the customary approach is to consider the applicable depth influence range in direct proportion to the unit front foot values of the front and back streets. The first step to determining the value is to find the merge line. The merge line calculation takes into consideration the higher market value of the property due to the influence from the street with a higher front foot value. Once the merge line is determined, the parcel is valued as two separate lots, following the three-step process for rectangular parcels. The separate values are then combined to a total value.

To calculate the merge line, follow these three steps:

- a) Add the front foot values (FFV_{TOTAL});
- b) Divide the parcel depth by FFV_{TOTAL} from step 1 (merge factor); and
- c) Multiply each front foot value by the merge factor from step 2.

Example 2.38



Merge line:

- a) $FFV_{TOTAL} = FFV_A + FFV_B = \$400/\text{ft} + \$200/\text{ft} = 600$
- b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 180\text{ft}/600 = 0.30$
- c) Merge line_A = $FFV_A \times \text{MF} = \$400/\text{ft} \times 0.30 = 120$. This means that the merge line is located 120ft from Street A.

Merge line_B = $FFV_B \times \text{MF} = \$200/\text{ft} \times 0.30 = 60$. This means that the merge line is located 60ft from Street B. Since $120\text{ft} + 60\text{ft} = 180\text{ft}$ = the total parcel depth, the merge line is correct.

Value of Lot A:

$$1) DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(120\text{ft}/100\text{ft})} = \sqrt{1.20} = 1.10$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$400/\text{ft} \times 1.10 = \$440/\text{ft}$$

$$3) \text{Lot Value} = \text{ADJ FFV} \times \text{FF} = \$440/\text{ft} \times 50\text{ft} = \underline{\underline{\$22,000}}$$

Value of Lot B:

$$1) DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(60\text{ft}/100\text{ft})} = \sqrt{0.60} = 0.77$$

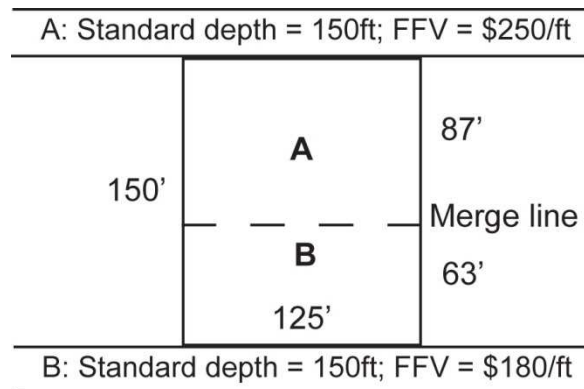
$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$200/\text{ft} \times 0.77 = \$154/\text{ft}$$

$$3) \text{Lot Value} = \text{ADJ FFV} \times \text{FF} = \$154/\text{ft} \times 50\text{ft} = \underline{\underline{\$7,700}}$$

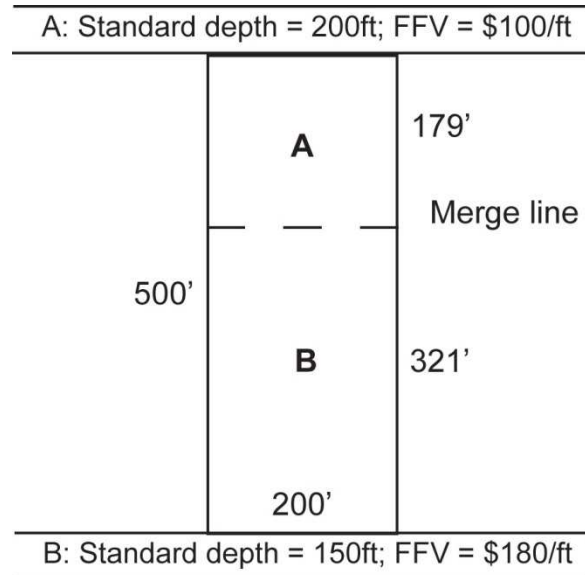
$$\text{Parcel Value} = \text{Lot Value}_A + \text{Lot Value}_B = \$22,000 + \$7,700 = \underline{\underline{\$29,700}}$$

Calculate the parcel value for each of the properties below. Assume the street frontage is at the bottom of each diagram.

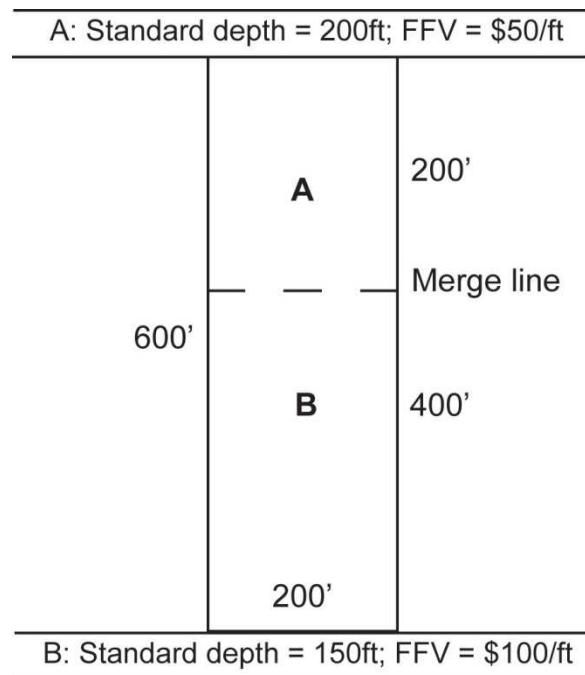
Example 2.39



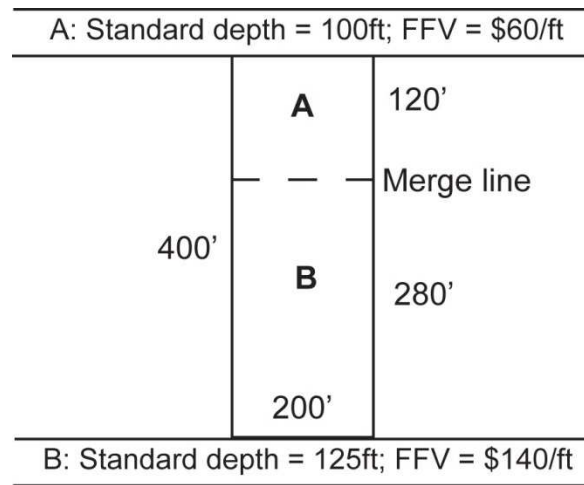
Example 2.40



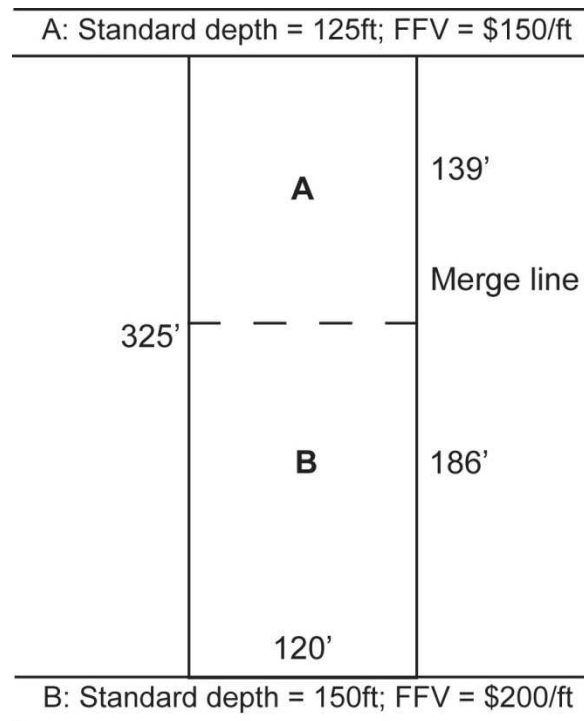
Example 2.41



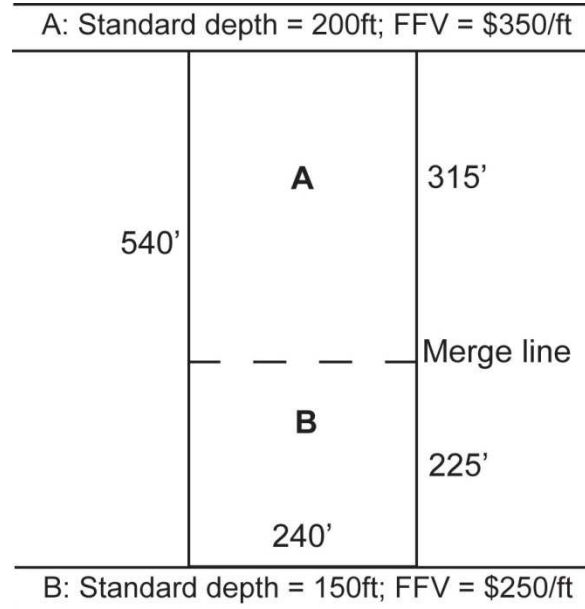
Example 2.42



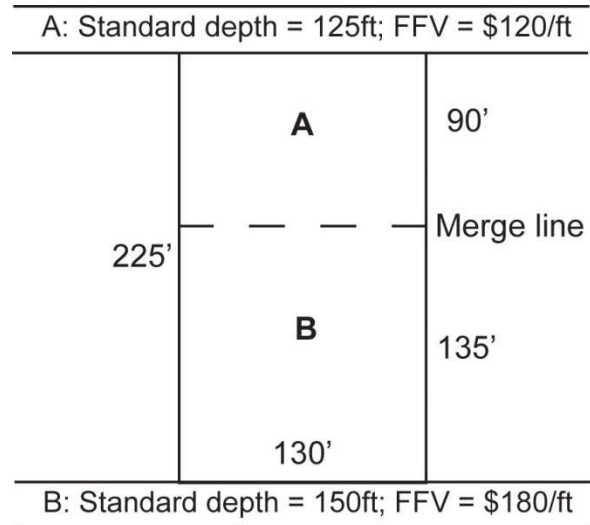
Example 2.43



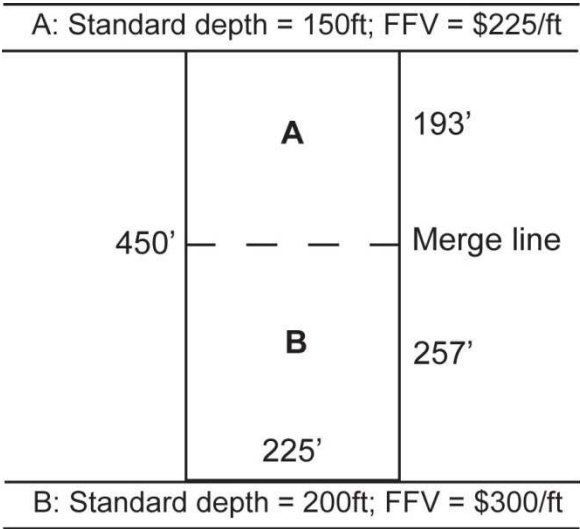
Example 2.44



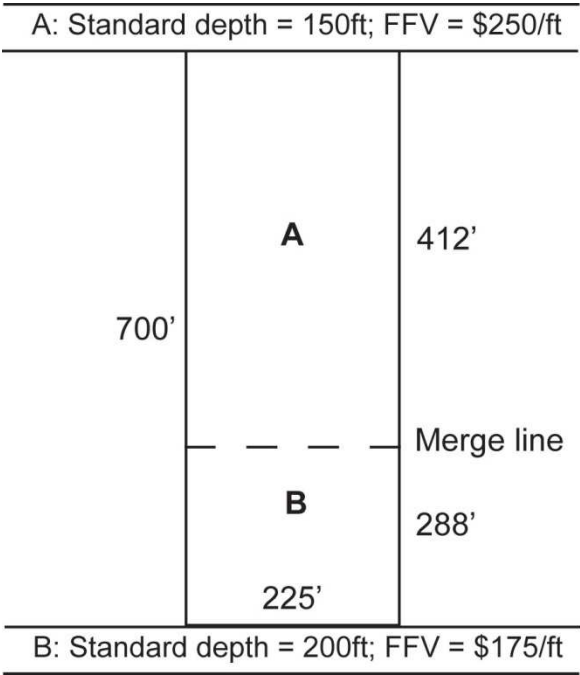
Example 2.45



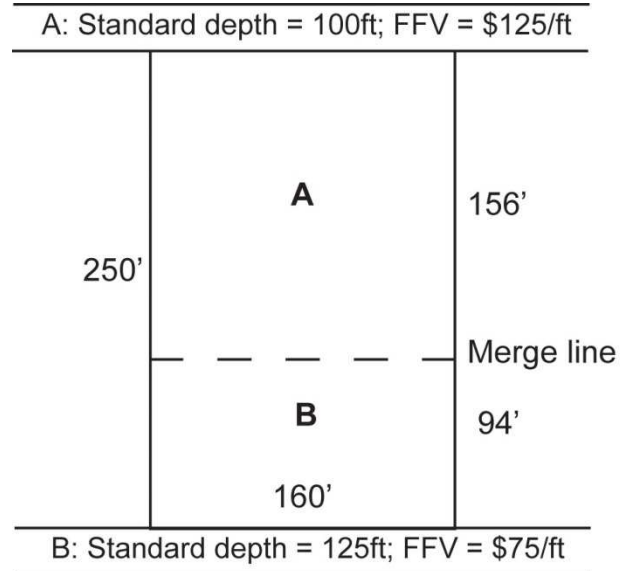
Example 2.46



Example 2.47

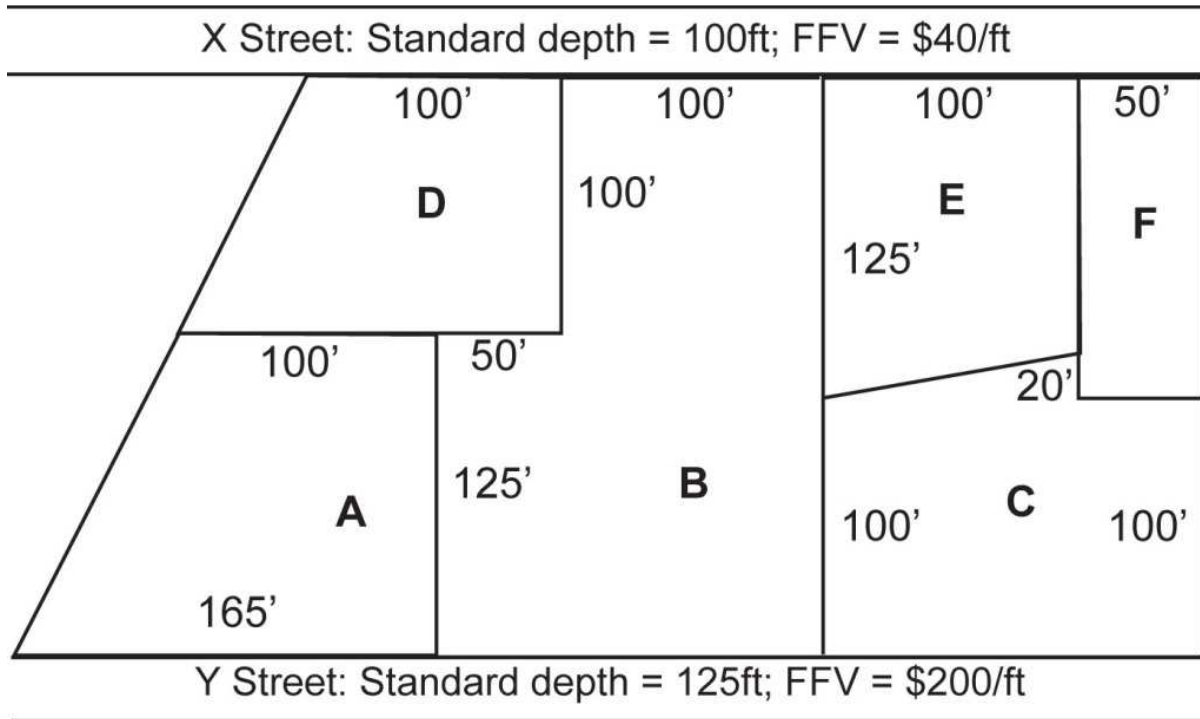


Example 2.48

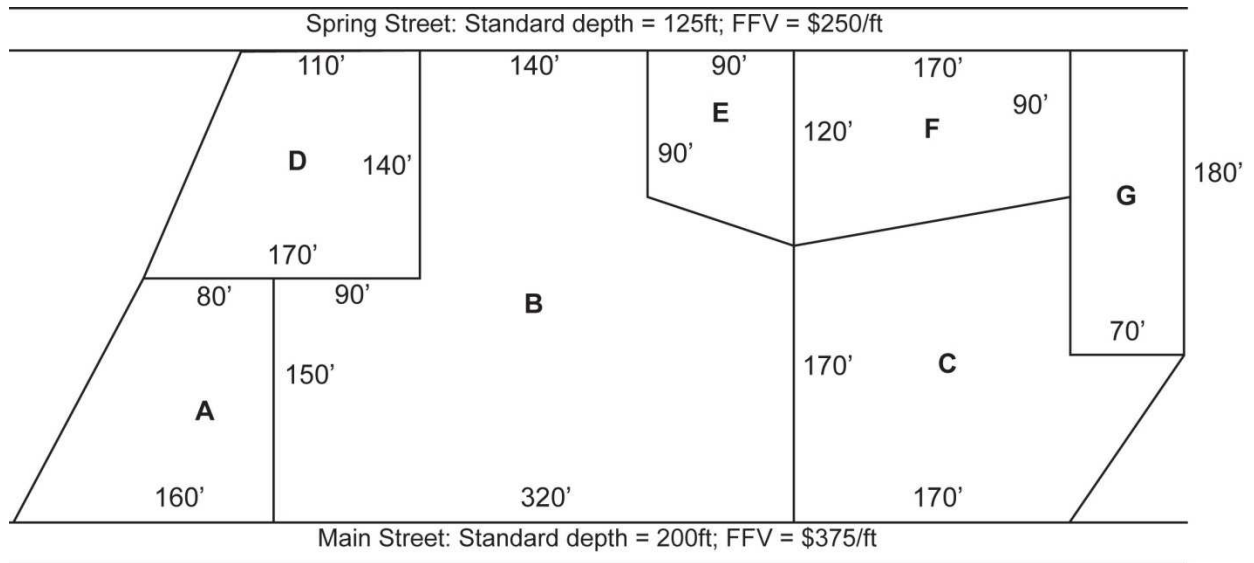


Value the Parcels Below, Using the Previous Methods

Example 2.49



Chapter 2 – Land Valuation



Square Foot Value

A property may be so valuable or of such size, it is sold in small increments. One square foot is 12 inches by 12 inches. For example, at \$2.00 per square foot, a 10,000 square foot lot is valued at \$20,000.

$$10,000 \text{ sq. ft.} \times \$2.00/\text{sq.ft.} = \$20,000$$

Front and Rear Acre Valuation

Sales of large parcels of land usually fall in this category. Parcels are sold per acre. Front acres, generally, are of higher value than rear acres. One acre is 43,560 square feet, or 208.71 ft x 208.71 ft. Usually the first acre of a sale will carry the bulk of the value. Other acres on the road, or front acres, will carry less value than the first base unit, but more than the rear acres.

Example: 1 base unit acre at \$10,000, 6 front acres at \$2,000 each or \$12,000, plus 21 rear acres at \$1,000 or \$21,000, amounts to a total value of \$43,000.

1 ac	x	\$10,000/ac	=	\$10,000
+ 6 ac	x	\$ 2,000/ac	=	\$12,000
+ 21 ac	x	\$ 1,000/ac	=	<u>\$21,000</u>
				<u>\$43,000</u>

Acreage calculations require the identification of a base unit (or acre) value from sales of single acres. Next, sales of frontage are studied and the front acre values identified. With these known facts plus sales of rear acreage parcels, rear acreage value is isolated. The order of determination may differ depending on the jurisdiction, but the logic is the same. Identify known components and determine residual values. Adjust based on volume and quality of acreage sold. Parcels classified under a current use program (tree growth, farmland, open space, working waterfront) are considered invalid sales for this purpose.

Front foot valuation is best suited to properties of consistent size and shape. Subdivisions for residential use may fall into this category. Should the lots be of an enhanced, upscale nature, the value may be based on acreage. Typical, old-style downtown lots could fit into a front-foot valuation schedule. Given the escalating costs of property, a square-foot pricing schedule is, possibly, a good fit.

Factors Affecting Land Valuation

The quality of land acutely impacts the valuation of farmland. Common classifications of value and concern are:

- Tillable/ Productive
 - Cultivated
 - Orchard
 - Pasture
 - Wooded (where wood is harvested)
- Non-tillable or non-productive
 - Scrub land
 - Ledge or shale
 - Swamp, bog or waste

Yield of tillable land is affected by soil texture, permeability, drainage, topography, and elevation/climate (early or late frost).

Common Influences:

- Location
 - Corner influence
 - Homogeneity of neighborhood
 - Zoning
 - Deed Restrictions
 - Topography
 - Excessive wetlands
 - Ledge outcroppings
 - Inharmonious influence
 - Irregular shape
 - Excessive area, depth or shallowness
 - Easements
 - Inharmonious influences (industrial, commercial, social and other)
 - Development rights encumbrance

Common Land Classifications

- Urban – developed & undeveloped
 - residential
 - commercial
 - industrial
- Rural - developed & undeveloped
 - residential

Chapter 2 – Land Valuation

- commercial
- industrial
- agricultural
 - a) unclassified
 - b) classified
 - 1) Tree Growth
 - 2) Farmland
 - 3) Open Space

CHAPTER 3

THE COST APPROACH

The Cost Approach

The most popular and effective method of property valuation is the cost approach. This approach uses construction cost schedules. These schedules develop an average cost of construction for buildings according to their size, quality of construction, type of structure, and structural details. If a subject property contains variations from the standard, such as three bathrooms instead of two, the assessor makes adjustments to the cost estimate. Some of the variations affecting cost are heating, plumbing, lighting, extra facilities, porches, attachments, or structural improvements. Variations that are substandard decrease the cost estimate, while items that are better than standard increase the cost.

Cost schedules are presented in standard units of measure and are easily applied to a large variety of properties. Standard units of measure include cost per square foot or cost per cubic foot. Cubic foot measure is usually found in commercial or industrial cost manuals. Affecting these values are situations related to local market conditions, local requirements and construction practices.

Cost schedules include prices for additions, porches, additional plumbing, heating, and outbuildings such as garages, sheds, stables, barns, gazebos, decks, docks, boathouses, corrals, and studios. Any constructed property item in a municipality must be included in the cost schedules.

Alternatives to Cost Schedules

One alternative to cost schedules is called the Contractor's or Quantity Survey Method. This involves a contractor or other knowledgeable individual making an estimate of the quantity of materials and labor necessary to construct the desired improvement. Typically, an itemized bill of materials is prepared, reflecting the cost of each type of material used together with labor charges for installation at the prevailing rates. A percentage rate is added for engineering and/or architect's fees, overhead costs, and contractor's profit. This method is both time consuming and expensive. It is accurate only if a trained person is developing the data. Furthermore, it is not feasible to perform such a study for each improved property within a typical jurisdiction. This method is often used in contractor bidding processes, rather than for mass appraisal.

Another alternative to cost schedules is referred to as the Unit-in-Place or Segregated Cost Method. This approach is useful if a special purpose facility is being

assessed and a traditional cost schedule approach cannot address the property's special features. The assessor estimates value based on a unit-in-place cost. It breaks down costs based on units of completed work. For example:

- Excavation – cost per cubic foot
- Foundation – cost per cubic yard of material and/or linear foot of wall
- Walls – cost per linear foot according to type of structure, such as brick, wood frame, and finishes

Modular/Mobile Homes

A mobile home is a factory-built residence designed to be towed on its own frame and wheel chassis to the site where it will be placed. A modular home is also built in a factory, then transported in pieces, by truck, to the site where it will be placed. The pieces of a modular home are assembled on-site.

The valuation of modern mobile homes is approached similarly to site-built homes – estimates of value can be taken from the residential cost schedules. Older mobile homes (generally built prior to 1976 in Maine) can be valued using a standardized mobile home valuation guide. This guide functions similar to ordinary residential cost schedules with the exception of grade (a measure of quality), which is usually determined by brand name. Size of a mobile home is referenced by overall length and width. Cost of room additions, gravel or concrete pads, tie-downs, porches, garages, and other improvements is usually taken from the general cost schedule.

Modular homes are valued like site-built homes. If a steel frame remains under the structure there may be a deduction in grade or an amount for functional obsolescence may be taken, if necessary.

For more information, see State of Maine Assessment Manual, Chapter VIII – Mobile Homes.

Farm Properties

A farm property may appear to be a residence. A farm, however, is a commercial property and the farmer is a business operator. The family home of the farm is priced like any other residence. Outbuildings may be of substantial value only to the extent to which they contribute to the farming operation and their ability to generate income.

Many farms in Maine today are family farming operations that have expanded out of the necessity to stay competitive. Barns may contain hay or the family poultry flock, but do not ordinarily contribute significant value to the business. Most Maine farms are dairy operations, but some are commercial crop operations, and they are usually small and often organic in nature.

Farmland may qualify to be valued at a lower rate, through the Farm and Open Space Tax Law program. The farm owner must apply to be included in the program and the local assessor will value the land based on the value of other farmland in the area.

For more information, see Property Tax Bulletin No. 20 – Farmland Tax Law.

Commercial and Industrial Properties

Rarely will a municipality develop a specialized cost schedule to address commercial and industrial property valuation. This is especially true when reliable, commercial, proprietary cost manuals are both available and affordable. The Marshall and Swift manual is probably the most popular.

When using any manual other than the jurisdiction specific schedule, all valuations from these other manuals must be adjusted by the ratio of assessments to sales.

These types of manuals will often have generalized valuation sections. They will also require different adjustments than a residential cost schedule. For example, most commercial property schedules will require adjustment for the number of linear feet of perimeter wall in the form of a wall ratio or the relationship of building perimeter to floor area. The fact is the more a building departs from the square the more wall is required to enclose the space. The more wall height that is required, the higher the cost of construction. Examples:

Square building $100' \times 100' = 10,000$ sq ft of area 400 linear feet of wall required

Rectangular shape $50' \times 200' = 10,000$ sq ft of area 500 linear feet of wall required

Rectangular shape $25' \times 400' = 10,000$ sq ft of area 850 linear feet of wall required

L-shape $50' \times 150' + 50' \times 50' = 10,000$ sq ft of area 500 linear feet of wall required

The extra wall made by an L-shaped building creates additional cost. Another adjustment made in these commercial manuals is for the wall height. A wall 18' high will cost more in materials and labor than an 8' wall height. These adjustments usually take the form of a percentage increase from the base price.

These factors generally do not appear in residential cost schedules. Residential property is usually built to similar standards (except for highly engineered or architecturally designed homes). This type of home will usually have a percentage of base value added to reflect the additional cost of professional design and oversight.

Steps in the Cost Approach

To determine value of improvements under the cost approach, an assessor must perform three steps:

- 1) Establish the replacement cost of the buildings.
 - a. Measure and inspect the building
 - b. Establish grades for the ten components of structure
 - c. Determine the replacement cost from cost schedules, based on building size and grade
- 2) Subtract depreciation from replacement cost
 - a. Physical deterioration
 - b. Functional obsolescence
 - c. Economic obsolescence
- 3) Determine land value

Land value is determined through a municipality's land pricing schedules. Those pricing schedules are developed through analysis of land sales and other property sales with the improvement values removed. For purposes of this chapter, land values will be given.

Use of Cost Schedules

This text references the State of Maine Assessment Manual. This manual is used by Property Tax Division personnel in the valuation of property in the unorganized territory.

When valuing property using the cost method, an assessor must determine the quality of the structure being assessed. Quality is measured by **grade**, a category that is split into five levels. Grade level takes into consideration modern design standards and practices, construction methods, materials, and workmanship. The five grade levels are:

Grade A	Best construction
Grade B	Good construction
Grade C	Average or expected construction
Grade D	Below average construction
Grade E	Low cost or cheap construction

The grade of a building reflects only the quality of the building, the materials and workmanship, the level of detail and quality of finish work. Cost varies with quality and any error or misjudgment in determining the quality of construction will affect the final value estimate adversely.

Grade is subject to continuing change, although it may be gradual. What may be or has been considered desirable or necessary to higher quality construction or design might

become neither desirable nor necessary with new developments and technology. Many buildings that we would now classify as Grade C or even D may have been Grade A when they were built. Quality will vary with changes in ideals, buying habits, and social traits of people. Quality must be measured through the eyes of the buyer in the market place.

Grade may vary according to location. It is subject to regional and local adjustment, local preference or custom, and local conditions. For instance, light framing in roof construction in moderate climates is suitable for California. In Maine, however, a lightly framed roof is unacceptable due to heavy snow loads.

Most structures are a composite of items with different grades. A new building is easier to grade than an old building because wear and tear has not affected the grade of the components that make up the new building.

Once the grade is established, the assessor can determine the property's replacement cost from the appropriate cost schedule. Replacement cost is defined as the cost to replace a building using current construction methods and materials. Replacement cost differs from reproduction cost in that reproduction involves using the same construction methods and materials as in the existing structure.

The next step in valuing property using the cost method is to determine the **condition** of the property. Condition differs from grade in that condition relates to the value of a structure after wear and tear and obsolescence have been recognized. The assessor term for wear and tear is **depreciation**. A building 25% depreciated is said to be in 75% condition (100% - 25%). The condition percentage applies whether the building was originally constructed with Grade A materials or Grade C materials. Grade is associated with construction, while condition is associated with destruction.

Example: You are assigned to value a 45-year-old ranch. The aluminum siding is not only dated but pockmarked with dents and its color has faded. Roofing shingles are five years past due for replacement. Your analysis results in the following conclusion.

- Recent sales show that this type of structure depreciates at approximately one-half percent per year (45 years x 0.5% = 22.5% or 0.225) due to physical wear and tear.
- The replacement cost new (RCN) of this house is \$100,000.
- The remaining value, or replacement cost new less depreciation (RCN-D) of the building is:

$$\$100,000 - (\$100,000 \times 0.225) = \$100,000 - \$22,500 = \$77,500$$

$$\text{Condition} = 100\% - 22.5\% = 77.5\%$$

Functional obsolescence is defined as a decrease in value due to a change in demand, usually because of a shift in consumer tastes or of market standards. Functional obsolescence is calculated in the same way that depreciation is calculated. Suppose the house in the previous example has a basement with only six feet of head room and concrete walls that are six inches thick. These features, which may have been standard when the house was built, are substandard in today's market.

- Municipal studies show that the functional obsolescence caused by these substandard features is 10% of value.

$$\begin{aligned}\text{RCN-D less functional obsolescence} &= \$77,500 - (\$77,500 \times 0.10) \\ &= \$77,500 - \$7,750 = \$70,000\end{aligned}$$

The overall condition of the structure is $\$70,000/\$100,000 = 70\%$

A high quality house, Grade A, might be in the poorest condition of any house in town, and a Grade E house might be in the best condition. The value of a house is a combination of grade, depreciation, and functional obsolescence.

Current Cost Factor

The current cost factor is a periodic adjustment to the cost tables to reflect market fluctuations in construction costs over time. For example, if the cost schedules being used are ten years old, then the current cost factor adjusts the costs to reflect current market prices. This cost factor is applied after replacement costs for all improvements have been estimated, and before accrued depreciation is applied.

Ten Components of Structure

When valuing a building, assessors use ten basic components to determine grade. The components are:

1. Foundation
2. Exterior
3. Framing
4. Floors
5. Electrical/lighting
6. Roof
7. Plumbing
8. Heat
9. Interior
10. Basement

Summary of Grade Requirements

Grade A (5): This grade usually applies to buildings that are architecturally designed, contractor built, with good materials and workmanship. A building of this grade has amenities, normally in the highest cost ranges.

Grade B (4): A building of this grade meets good building standard requirements with no architectural supervision. These buildings will ordinarily exceed standard building code requirements. Materials and workmanship are satisfactory and the building provides comfortable living space. Cost of construction and materials fall in the above average category.

Grade C (3): This grade of building will lack specialty design and ordinary lack originality. This type of building will often be found in track style developments. A building of this grade usually meets, but doesn't exceed, building codes. Material and workmanship for these buildings are of production line quality. This type of building will fall in the average price range.

Grade D (2): A grade D building will be of substandard construction and usually lack modern facilities and equipment. This building will provide basic living space. Workmanship and materials for these buildings will be substandard compared to current building practices. Older homes will often fall in this grade.

Grade E (1): These structures are usually basic shelter but inadequate for residential living on a full-time basis. A building of this grade may be amateurishly constructed. The design, materials, and workmanship for these buildings are crude and rough. Summer camps will often fall in this category. These are cheap buildings.

See Assessment Manual Chapter 4 to review the specifications of the different grades. Become familiar with the requirements of each component for each grade of structure. Valuing a building requires the assessor to record and grade each component.

Inspecting, Measuring, and Listing a Building

There are five items an assessor must determine when making a field survey of a residential property. They are:

1. Grade
2. Additions/deductions from established standards
3. Depreciation
4. Functional obsolescence
5. Economic obsolescence

When beginning to inspect, measure and list a property, there are several steps to take before approaching the structure. First is to become familiar with the cost schedule to be used. The property record card should correspond to the data required by the cost schedule.

The property record card should have the owner's name, mailing address, and contact information (phone number and email address). The property record card should also contain the property location, map and lot number and other ownership information. Comparing the owner's information and the property location will help determine if the building is owner occupied. Information on the property record card must match the information on the tax map to ensure that the correct structure is being valued.

When approaching a building, look at the overall structure and ask several questions.

- What is the color? – note it on the property record card.
- Is the roofline straight? – an indicator of condition.
- How many stories? - establishes how the building must be measured.
- What is the roofing and siding material and condition?
- Is there a basement, and what is the foundation material?
- Is there an oil fill spout (which may indicate an oil fired heating system)?
- Where is the electrical entrance (the point where power lines enter the structure)?
- Are there additions to measure and inspect?
- Is there a pool or are there any outbuildings?
- What obstacles or hazards are there to measuring this particular building – fences, holes, mud, thorn bushes, animals, electrical lines, septic systems malfunctioning, etc.?

In other words, the assessor must use common sense to stay safe and practice powers of observation to collect as much correct and applicable data as possible.

Different jurisdictions will have different procedures for their assessors to follow. Some basic guidelines can assist in good data collection and prevent problems before they occur.

Try to gain entry to the structure. Knock on the door, introduce yourself, and show identification. If the owner asks (or tells) you leave, leave and make an estimate of the building and property characteristics from the public street. Assessors do not have the right of entry to a private residence. Enter a building only if an adult is present.

The interior inspection should start in the basement. A lot of helpful information can be found in the basement of a building. The following items affecting both grade and condition can be determined:

- Quality of stairs
- Foundation and basement material

- Basement ceiling height
- Finished basement area
- Water and other condition problems
- Type of heating system
- Quality of the flooring and wall framing (if exposed)
- Plumbing/piping quality
- Electrical rating and age
- Settling and framing issues

When going through the rest of the building, look for other benchmarks of the building specifications for the cost schedule in use.

Measuring can present a variety of challenges. Hazards are usually present in some form and require the assessor to stay alert. Start by identifying the story height of each portion of the building and determine what type of foundation and basement situation is pertinent to each section. Measure the building with this observation in mind. Two-story sections must be isolated from one-story sections. If a portion of the two-story area is not on, or on a different type of, foundation or basement, this area must also be isolated. Measure all around the building, with a number for each side. Some office procedures call for rounding to the nearest foot. If rounding is used, remember to compensate for it when drawing the sketch.

Make a rough sketch as you proceed around the building, measuring each different section. It is necessary each section of the building have a length, width, height and basement/foundation dimension associated with it. On the rough sketch, draw the building while keeping the measurements in proportion. Add up the dimensions on the sides of the building to ensure they add up correctly. If the sides do not add up, something has been missed or is incorrectly measured.

When making the final sketch, always use a straightedge; draw it to scale with the side facing the street towards the bottom of the property record card. Drawing with this orientation makes identifying the building from the street easier. Keep the sketch neat and centered in sketching area of the card, without erasures. Story height, square footage, measurements, additions, outbuilding locations, etc. should all be shown on the property record card.

Suggested Abbreviations

Standardized abbreviations provide for consistent application of cost schedule data. It should be clear to the staff what is being priced. The following are some abbreviations found in the assessment field. Enter the appropriate designation on the part of the sketch represented. The square footage of the area is calculated and entered on the corresponding area and a circle drawn around the number.

Chapter 3 – The Cost Approach

Story Height	One story (1 St), One-and-a-half story (1 ½ St), Two story (2 St), etc.
Attic	A – finished (fin) or unfinished (unfin)
Basement	Full Basement (B) Concrete Slab (CS) Crawl Space (Cwl Sp) Daylight Basement (DB) with ¼, ½, ¾ indicated No Basement (NB)
Posts	Wood posts (WdP) Concrete posts or sauna tubes (ConP)
Porches:	Open Porch (OP) Enclosed Porch (EP) Screened Porch (SP)
Overhang	OH
Floors	Dirt (DF) Concrete (CF) Hardwood (HW) Softwood (SW)
Framing	Wood Frame (F) Brick (Br) Masonry (M)
Garage	GAR
No Value item	NV

Example: A one-and-a-half story wood framed building on a one-half daylight basement and an unfinished attic would be designated:

1 ½ St/F/DB ½/A – unfin

A partial list of abbreviations is found in Chapter 5 of the Assessment Manual.

Story Height Determination

It is necessary to accurately determine story height because of its relationship to useable floor area. Generally, a full story provides adequate headroom for the majority of the residential home buyers. In Maine, most wall framing is eight feet tall. An assessor should observe if there is appropriate headroom in stairwells and in the basement. An upper floor with full headroom would be considered a full additional story. However, the eaves of the roof on a half story will generally fall between the shoulder and hip. When you encounter this situation, observe the actual amount of

useable floor space – usually it is about half of the first floor. An attic has even less useable floor space and is priced according to its contribution to the overall structure.

The cost schedule in use may have guidelines; if so, use them. See Chapter 5 of the Assessment Manual.

Garages and Outbuildings

Like other improvements, the cost schedule provides the basis of the value these items contribute to the whole property. Often, miscellaneous structures cost more than the value added to the property. For example, in-ground swimming pools can easily cost thousands of dollars, even when added to an average home of modest design. Yet, they fail to add an equal amount of value to the property as a whole. Therefore, it is important, when assigning listing and later assigning a value, that those values be viewed as the amount they contribute to the entire property, not just what they cost to acquire and install.

Each out building needs to be discovered and measured. This is the purpose in always walking entirely around a property. Story height and finish needs to be established, especially over an unfinished or partially finished garage. Condition must also be noted, in addition to the physical characteristics of the buildings, to make an estimate of value.

If pools, fencing, wood decking, or patios of block or concrete are items included in the inventory of improvements to be valued, their size and condition must also be noted.

See Chapter 5 of the Assessment Manual.

Pricing and Cost Schedule Structure

A residential cost schedule is structured around the value of average homes, for a variety of sizes. From this central structure, variations of quality are made through percentage adjustments, thereby creating schedules for the five main grades of homes.

After determining grade, additions and deductions, depreciation, functional and economic obsolescence, then calculating the square footage of the structure being priced, an assessor refers to the cost schedule for the correct grade and size. All other improvements are priced as additions or deductions. Next, reduce the replacement cost from the cost schedule by the appropriate amount of depreciation. The result is the value estimate for replacement cost new less depreciation, or RCN-D. Look at the result and consider if it makes sense. Is the value estimate representative of the sales data under study and is it comparable to other, similar properties?

See, discuss and try a couple of small examples - Chapter 6 Residential Cost Schedules Assessment Manual.

Sample Appraisals

Read and review sample appraisals found in Chapter 7 of the Assessment Manual

Appraisal Problems

see Appraisal Problems Handout

CHAPTER 4

DEPRECIATION AND OBSOLESCENCE

Depreciation and Condition

Condition is equal to the value of property after depreciation, divided by the property value before depreciation.

The International Association of Assessing Officers (IAAO) defines depreciation as:

“Loss in value of an object, relative to its replacement cost new, reproduction cost new, or original cost, whatever the cause of the loss in value. Depreciation is sometimes subdivided into three types: physical deterioration (wear and tear), functional obsolescence (suboptimal design in light of current technologies or tastes), and economic obsolescence (poor location or radically diminished demand for the product).”

Depreciation for the assessor differs from that used for accounting purposes. Accounting depreciation is a method to spread out the cost of a capital expenditure over a period of time. Land is not subject to accounting depreciation. Assessors apply depreciation differently.

Depreciation used in mass appraisal is determined by activity in the marketplace and is related to the market value of a property. Depreciation is the difference between replacement cost new and market value. This is also referred to “accrued depreciation”; it is the measure of the total value lost to depreciation.

The annual straight-line depreciation rate, for accounting purposes, is calculated by dividing 1 by the asset life of the building. For example, an industrial building has an asset life of 40 years. The annual straight-line depreciation rate is:

$$1/40 = 0.025 \text{ or } 2.5\%$$

If the building cost \$100,000 new, depreciation is equal to \$2,500 each year (\$100,000 x .025). The book value of the building is the cost less accrued depreciation. After one year, the book value of the building is \$97,500 (\$100,000 - \$2,500). After two years, the book value is \$95,000 (\$97,500 - \$2,500). Accounting depreciation has no bearing on market value and is useful to assessors only when applying the income approach to value.

There are several methods of accounting depreciation used, but the most popular are straight-line depreciation and accelerated depreciation. Straight-line depreciation applies the same dollar amount of value reduction each year. Accelerated depreciation

reduces value more in the early years than in later years. These methods are called indirect methods of depreciation.

Direct Method of Depreciation

The direct method of depreciation in the Maine Assessment Manual is called the breakdown method. The breakdown method estimates loss in value through inspection and observation of detailed structural components of property. This method applies the recognition, recording, and evaluation of specific causes of depreciation and their effect on value. Examples of specific causes of depreciation include wear and tear, age, and function within the building.

Modern mass appraisal techniques use a market modified method consistent with the cost approach and reflective of the direct method of depreciation. The loss of value is measured by physical wear and tear and other relevant factors and is correlated to the loss in value measured from the marketplace. Depreciation must be determined by observation, informed judgment, and study in each instance. The actual physical condition of the structure – as well as its relationship to other mutually comparable structures and locations – must be taken into consideration.

The accepted percentages of depreciation assigned should be commensurate with the condition of the property. Many cost schedules are designed so the percentage of depreciation falls within these ranges. The Maine Assessment Manual establishes these benchmark percentages as:

Excellent	10% (90% condition)
Good	20% (80% condition)
Average	30% (70% condition)
Fair	40% (60% condition)
Poor	50% (50% condition)
Unserviceable	> 50%, according to degree of deterioration

April 1 is the tax situs date in the state of Maine. Therefore, when considering depreciation of a structure or improvement, it should reflect the condition as of April 1. Only past events should be taken into consideration, not what will or may happen. If a building is scheduled to be demolished on April 2, that should not affect the valuation for April 1.

Physical Deterioration

Physical deterioration is the wearing out of a structure. It may be the result of wear and tear, use, or disuse. In many instances a structure will disintegrate or lose utility more rapidly as a result of disuse rather than use.

Physical deterioration is due, in part, to the action of the elements: rain, wind, hail, sun, shade, moisture, extreme dryness, storms, heat, cold, flood, decay, rot, etc. Disintegration from abuse is different from that of use or disuse. Other factors may come into play, such infestations of carpenter ants, termites, or animals.

Finally, physical deterioration could in part result from poor construction. Exposed rafter ends, basements not waterproofed, and unfinished siding are examples of poor construction.

Functional Obsolescence

The IAAO defines functional obsolescence as a “[l]oss in value of a property resulting from changes in tastes, preferences, technical innovations, or market standards.” Functional obsolescence is the result of causes contained within the structure itself. A test to generally determine the presence of functional obsolescence is to ask if a similar structure built today would retain all of the general characteristics of the subject property, regarding design, size, materials, and facilities.

Functional obsolescence falls into several categories. These are:

Super-adequacy. A super-adequacy means the property contains a quality that is higher than current standards. Examples are:

- Too many rooms
- More facilities than needed
- Too large a structure, excessive square footage or area
- Ceilings too high
- High cost finish and trim
- Excessive built-ins not commensurate with home quality
- Expensive metals (gold faucets, brass balustrades etc.)

Inadequacy. An inadequacy means that the structure falls short of current market expectations. Examples are:

- Too small a structure
- Rooms too small
- Too few rooms
- Limited facilities
- Lack of storage area

Lack of Desirability. A lack of desirability means the property design is not in keeping with current standards. Examples are:

- Excessive ceiling heights
- Expansive halls, wasted space
- Strange shapes or situations (below ground, on stilts, domes, etc.)
- Design causing high maintenance cost

- Design with expensive items and little utility, carved wood trim and wainscoting, stained glass windows
- Antique or contemporary design out of step with market desire

Eccentric Design. An eccentric design is one departing from the accepted market standards as to construction/ desirability. Examples are:

- Whimsy or unusual ideas of the builder
- Does not include houses built to attract a specialized market, like reproduction homes

Atypical Layouts

- Poor layout/ use of floor area
- Traffic flow undesirable (access to rest of home through a bedroom, etc.)
- Unusual shape or size resulting in unbalanced utility.

Outmoded equipment

- Bath rooms and plumbing (slate sinks, kitchen counters which are not waterproof)
- Electrical outlets (number and type, no GFI [ground fault indicator], fixtures)
- Heating (fireplaces as only heating system, no central heat, wood fired furnace only)

Economic Obsolescence

Economic obsolescence may be defined as a loss of value arising from causes external to the property. An owner has no control over this type of value loss, which can stem from an oversupply of equally desirable properties or from changes in character of neighboring properties. A neighborhood change could be one or more properties being rezoned for commercial or industrial development. The closer the rezoned property is to the subject property, the greater the loss of value. Another example of economic obsolescence is a neighborhood's collective lack of attention to property maintenance over time.

It is possible for land to experience value loss due to economic obsolescence. For example, if a low-grade house is built on high priced land would depress the lot's value. This type of construction also affects nearby properties and can decrease those valuations.

The availability of services is a source of either economic enhancement to, or detracting from, value. Public services usually enhance the value for properties in the average marketplace. These include:

- Water, sewer, and sanitation – trash and recyclable collection
- Public safety – police protection, fire protection and rescue availability
- Highway development and maintenance, snow removal

- Storm drainage
- Sidewalks
- Library
- Recreational opportunities
- Transportation to schools and businesses
- Education and cultural opportunities

Private services also enhance a property's worth, but may not increase it to the same degree as public services. Some private service considerations:

- Electricity
- Telephone
- Wireless communication availability
- Ability to access fuel for heat and other needs
- Gas
- Cable television, high-speed internet availability

Accessibility is another major factor affecting value. Value is influenced by the cost of gasoline and diesel fuel, and the existence and condition of roads leading to the subject property. The type of vehicle necessary to travel poorly maintained or unpaved roads can carry a high cost and can impact a homebuyer's decision. Lack of access will have less effect on seasonal property or extremely high valued property where privacy is the goal of the homebuyer.

Topography impacts property value. Land must provide the amenities expected according to the quality of the structures on it. Too small a lot to provide useful outdoor living space detracts from desirability and thereby the value, of a quality home. A steep driveway makes access difficult and complicates snow removal. Side-hill lots sometimes require stairs, and steep grades may be difficult to negotiate with children, purchases or physical challenges.

Most property record cards have areas designed for the recording of economic factors. They are under the general headings:

- Neighborhood
1. Accessibility
 2. Utilities
 3. Services
 4. Topography
 5. Other

In review, depreciation consists of three separate and distinct aspects, each of which must be considered individually for its effect on the value of a property.

1. Physical deterioration is the disintegration or wasting away of a structure

2. Functional obsolescence is the lack of functionality inherent in a structure as compared with average market demands
3. Economic obsolescence is the effect of external factors on the value of property

Both physical deterioration and functional obsolescence have two common characteristics. They are restricted to causes originating within the structure itself and are said to be inherent or intrinsic aspects of depreciation. With either, there is the possibility the condition may be corrected or cured.

Economic obsolescence cannot be controlled or cured by the owner of the property. It is said to be extrinsic, resulting from factors outside of the property itself. Often, it has a greater impact on value other than depreciation considerations.

See Maine Assessment Manual, Chapter 5, Residential Field Survey for a further discussion on depreciation and obsolescence.

CHAPTER 5

MARKET APPROACH

The market approach is also known as the market data approach, the sales comparison approach, the comparison approach, or the market data study. This approach is widely employed in assessment of residential properties. It is also used in the assessment of land, and limited commercial and multifamily properties. The principle of substitution is the basis of this appraisal method.

The property to be assessed is referred to as the subject property. Sold properties used as comparisons are called comparables. To achieve an estimate of value for the subject, the selling prices of comparables are adjusted. Adjustments are based on the differences between the subject and the comparable.

All things (the value of money, supply and demand, and the economic situation of the area) being equal, comparables should provide a valid base for determining the value of subject property.

The adjustments to comparables are either additions or subtractions, based on differences with the subject property. When a comparable is more valuable than the subject, the selling price must be adjusted downward to reflect the lesser quality or quantity of the subject. When a comparable is less valuable than the subject, the selling price of the comparable must be adjusted upward to reflect the better quality or quantity of the subject. For example, if a comparable has three bedrooms and the subject has two bedrooms, the comparable sale price will most likely be adjusted downward, since a three-bedroom home is ordinarily more valuable than a two-bedroom home. This comparison and adjustment is done for each difference between the subject and the comparable.

The results of the adjustments provide a range of values for the subject. Generally, the sale with the smallest adjustment, in dollars, is the best indicator of value. However, if the soundness of the adjustment is less than desirable, a comparable with a larger adjustment may be a better indicator. For example, if the difference in sale prices between three-bedroom homes and two-bedroom homes fluctuates significantly in an area, but the difference between two-bedroom and four-bedroom homes is more consistent, an adjusted four-bedroom comparable may be a better value indicator for a two-bedroom home than an adjusted three-bedroom comparable. It is up to the assessor to decide the most reliable estimate.

An advantage of the market approach is the ease of understanding when presented to a taxpayer. It is reliable, especially when there are sufficient sales to be considered. The good judgment of the assessor is a vital component in the use of this approach. Adjustments to comparables must be based on studies of recent area sales.

There are disadvantages with the market approach. It may be difficult to verify sales data; no two properties are identical and value differences are essentially subjective interpretations of market trends. Two condominiums in the same complex can have vastly different values if one faces east and has mountain views while another faces north and overlooks a building or parking lot. The age and physical condition of a property can substantially affect its value. Two houses can be alike structurally, yet be subject to different levels of maintenance. The market approach is time-consuming, which poses a disadvantage for the assessor. However, it is a dependable method to use in defense of the cost approach and income approach information.

The market approach is a valuable tool in determining an estimate of value and is essential in the correlation of the three approaches to value.

Procedure

There are five basic steps in the application of the market approach:

1. Find recently sold property that is similar to the subject (comparables).
2. Verify the information obtained about the comparables.
3. Select relevant units of comparison (for example, dollars per square foot).
4. Compare comparables to subject and adjust sale price of each comparable through a comparative market analysis. A comparative market analysis consists of three steps:
 - a. Identify the comparison characteristics.
 - b. Compare characteristics of comparables and subject property.
 - c. Adjust comparable values.
5. Reconcile the adjusted values of the comparables to determine a value estimate for the subject.

Comparative Market Analysis

Step 4 of the market approach procedure involves a comparative market analysis. In a comparative market analysis, a subject property is compared to sales of similar type properties. After making appropriate adjustments for differences in characteristics, the assessor determines the value of the subject property.

There are three basic steps in the comparative market analysis process:

1. Identify the comparison characteristics. Each comparison characteristic falls into one of four categories called elements of comparison:
 - a. Real property rights (fee simple, leased fee, etc.)
 - b. Market conditions (time adjustments, seller/buyer concessions, etc.)
 - c. Location (busy street vs. side street, etc.)
 - d. Physical characteristics (size, condition, number of rooms, etc.)
2. Compare the characteristics of each comparable with those of the subject property and make appropriate adjustments.
3. Derive a net adjustment for each comparable and apply it to its sale price to produce an adjusted value.

In a comparative market analysis, the comparable property – not the subject property – is adjusted. If a comparable has a superior characteristic then a subtraction adjustment is made to the comparable. If a comparable has an inferior characteristic then an addition adjustment is made to the comparable.

A net adjustment for each comparable is calculated by summing the addition and subtraction adjustments. The net adjustment is then applied to the sale price of the comparable to produce an adjusted value.

Reconciliation of the adjusted values requires examination of the data to determine a value estimate for the subject. Ordinarily, the subject value estimate will be the adjusted value of the comparable with the smallest adjustment, provided the data doesn't point to a different conclusion. The subject property value estimate should not simply be the average of the adjusted values.

Step 1 of the comparative market analysis is to identify the comparison characteristics. Once the characteristics are identified, the assessor must determine the adjustment amount – or value – for each characteristic. The best way to estimate characteristic value is to perform a paired sales analysis, which involves comparing two properties that are similar, with the exception of one characteristic.

Example #2

You have found three recent single-family home sales in the same neighborhood with similar style, size, age, quality, and amenities except one of the properties has a

Chapter 5 – Market Approach

garage. To calculate the value of the garage, compare the sale prices of the three properties.

Sale 1(with garage) sale price =	\$172,000
Sale 2 (without garage) sale price =	<u>\$159,500</u>
Value of garage =	\$ 12,500

Sale 1(with garage) sale price =	\$172,000
Sale 3 (without garage) sale price =	<u>\$158,000</u>
Value of garage =	\$ 14,000

By performing these two paired sales comparisons we can reasonably conclude that the market value of the garage is between \$12,500 and \$14,000.

Step 2 of the analysis is to compare the characteristics of each comparable with those of the subject property and make appropriate adjustments. This step is accomplished through a grid showing the subject and comparable properties.

Each column in the grid represents the subject property or a comparable. Each row represents a comparison characteristic. The bottom rows list the number of adjustments, the net adjustments, and the adjusted sale prices.

The example on the next page illustrates the analysis grid.

Comparative Market Analysis

Adjustments

\$25/sf for building area difference

\$1,500 for finished basement

\$500 for deck

\$5,000 for one-car detached garage

<u>Elements</u>	<u>Subject</u>	<u>Comp 1</u>	<u>Comp 2</u>	<u>Comp 3</u>
Sale Price	-----	\$199,000	\$206,000	\$210,000
Size	1,180sf	1,080sf	1,220sf	1,320sf
Adjustment	-----	\$2,500	(\$1,000)	(\$3,500)
Basement	Unfinished	Unfinished	Unfinished	Finished
Adjustment	-----	-----	-----	(\$1,500)
Deck	Deck	Deck	None	Deck
Adjustment	-----	-----	\$500	\$0
Garage	None	None	None	one-car det
Adjustment	-----	-----	-----	(\$5,000)
# of Adjustments		1	2	3
Net Adjustment		+\$2,500	-\$500	-\$10,000
Adjusted Sale Price		\$201,500	\$205,500	\$200,000

Subject Value = \$201,500

Explanation: The subject value is equal to the adjusted sale price for Comparable #1, which had the fewest number of adjustments. The fact that the adjusted sale price for this comparable also fell in between the other two adjusted sale prices provided support for using that value estimate.

Class Problem

Example 5.2

Determine, using the data below and your own judgment, the value of the following subject property.

The subject property and all three comparables are located in the same area. All four properties are connected to public water and sewer and they all have typical sized parcels.

Subject: Located on a secondary street with typical appeal. The house is a 22 year old ranch, 1,040 square feet in area, with recent updates, and is in good condition. It has a full basement that is 50% finished. Amenities include an open porch in the front, a deck in back and a one-car garage.

Comparable 1: Sold for \$159,900, this house is located on a secondary street with typical appeal. The house is a 28 year old ranch, 960 square feet in area, in average condition. It has a full basement that is completely finished. Amenities include a deck in back.

Comparable 2: Sold for \$178,000, this house is located on a secondary street with typical appeal. The house is a 20 year old ranch, 1,144 square feet in area, with recent updates, and is in good condition. It has a full basement that is unfinished. Amenities include an enclosed porch in the front, a deck in back and a one-car garage.

Comparable 3: Sold for \$195,000, this house is located on a secondary street with better than average appeal. The house is a 20 year old ranch, 1,232 square feet in area, with recent updates and is in good condition. It has a full basement that is 25% finished. Amenities include an open porch in the front, a deck in back and a two-car garage.

Paired sales analyses have determined the following characteristic values.

- \$5,000 for a good location
- \$7,500 for an age/condition adjustment;
- \$35/sf for difference in area
- \$1,500 for a 25% finished basement
- \$3,000 for a 50% finished basement
- \$4,500 for a 75% finished basement
- \$6,000 for a fully finished basement
- \$4,000 for an enclosed porch
- \$2,500 for an open porch
- \$1,500 for a deck
- \$5,000 for a one-car garage
- \$9,000 for a two-car garage

Comparative Market Analysis

<u>Elements</u>	<u>Subject</u>	<u>Comp 1</u>	<u>Comp 2</u>	<u>Comp 3</u>
-----------------	----------------	---------------	---------------	---------------

Sale Price

Location/site
Adjustment

Age/condition
Adjustment

Size
Adjustment

Basement
Adjustment

Deck
Adjustment

Garage
Adjustment

of Adjustments

Net Adjustment

Adjusted Sale Price

Subject Value =

Explanation:

Answer on page 170

CHAPTER 6

INCOME APPROACH

The income approach creates a value estimate for income-producing property based on the anticipated income from that property. The income approach is sometimes referred to as the income capitalization approach, since the calculated value is the result of the application of a capitalization rate to estimated future income. The capitalization rate converts the future income to a present value.

The basic formula for the income approach is: $V = I/R$, where V = Value, I = Income, and R = Rate. Income is an estimate of future net operating income for the property. Rate is the capitalization – or cap, for short – rate.

Example 6.1. What is the value of a motel with \$60,000 of income and a capitalization rate of 12%?

$$V = I/R = \$60,000/12\% = 60,000/0.12 = \$500,000$$

The income approach is primarily based on two principles of value, the principle of substitution and the principle of anticipation.

The principle of substitution says that property value tends to be set by the cost of acquiring an equally desirable substitute property provided such substitutes are available without costly delay.

The principle of anticipation says that market value is the present worth of all anticipated future benefits derived from the property. Those benefits must be either income or amenities. For most single-family, residential property, future benefits are measured in amenities (location, distance to work, quality of school system). For income-producing property, future benefits are measured by the estimated income the property will produce.

The Maine Supreme Court has ruled that assessors must at least consider all three approaches to value when assessing property. Usually one of the three methods is best suited for general assessment, but applying a second approach to validate values is a good practice. Different methods may be used for different property, as long as fair market value is achieved.

While there are many different types of income-producing property, this text will concentrate on residential rental property, or apartment buildings.

Definitions

Following are some of the terms associated with the income approach to value.

- Capitalization – The process of converting anticipated income from a property to a present value by dividing that income by an appropriate rate of return (capitalization rate). The two types of capitalization are direct capitalization and yield capitalization.
- Direct Capitalization – The direct capitalization method uses the estimated income for the first year following the date of valuation to calculate an estimated value of income-producing property.
- Declared Ratio – The ratio of assessed value for a municipality to the fair market value of that property. This ratio is “declared” by the municipality on its annual municipal valuation return. The declared ratio is sometimes referred to as the certified ratio.
- Discount Rate – The weighted average of mortgage interest rate and equity yield rate. For purposes of this text, we will assume that funds used for purchase of property are borrowed, meaning the discount rate will be equal to the interest rate.
- Effective Tax Rate – municipal property tax (mill) rate multiplied by that municipality’s declared ratio. For example, if the mill rate is 20.00 (\$20.00/\$1,000 property value, or 2%) and property in the municipality is assessed at 90% of market value, the effective rate is $2\% \times 90\%$, or $0.02 \times 0.90 = 0.018$, or 1.8%.
- Equity Yield Rate – The required interest rate for investor funding.
- Miscellaneous Income – Income from sources incidental to the primary function of a property. For example, in rental property, miscellaneous income would be revenue generated from laundry facilities, garage or storage space.
- Mortgage Interest Rate – The interest rate on borrowed money.
- Net Operating Income – Potential gross income, plus miscellaneous income, less vacancy and collection loss, less operating expenses.
- Operating Expenses – Generally, all recurring expenses that are subtracted from gross income to produce net operating income. Operating expenses fall into three categories:
 1. Fixed costs, such as real estate taxes and mortgage loan payments;
 2. Variable costs, such as administration, utilities, and supplies; and

3. Replacement reserves – funds set aside for ongoing, periodic costs, such as roof repair.
- Potential Gross Income – The maximum revenue expected to be generated in the future. For purposes of direct capitalization, estimated income for the first year following the valuation date is used for potential gross income.
 - Recapture Rate – The annual rate at which an investment is returned over the economic life of property. The recapture rate applies only to buildings and other improvements. Land is not subject to a recapture rate because it generally does not have a finite economic life and does not lose value. The recapture rate is calculated by the equation: $1/(\text{economic life of asset})$. For example, if a building has an economic life of 25 years, the recapture rate is $1/25 = 0.04$ or 4%. The required annual return of investment for a 25-year asset is 4% each year.
 - Vacancy and Collection Loss – Rent loss due to vacancy and loss from inability to collect all rent due.
 - Yield Capitalization – The yield capitalization method uses income estimates from multiple years following the valuation date to calculate the estimated value of income-producing property.

Income

The income part of the $V = I/R$ equation starts with an estimate of potential gross income (PGI). Using the direct capitalization method, PGI is an estimate of the maximum revenue expected to be generated in the year following the date of assessment. Estimating PGI for rental properties involves the consideration of the local rental market, including area rental prices, rental history, prospective tenant market, the ability for the average tenant to pay, and the demand for apartment space. You, as the assessor, must determine how the current market conditions will affect future rental income.

Income not directly related to the property as a whole is called miscellaneous income (MI). MI generated by residential rental property is income other than rent. Examples of miscellaneous income are income from laundry facilities or income from the rental of garage or storage space not included in rent.

In determining income, the assessor must also analyze market data to estimate vacancy and collection loss (VCL). VCL consists of rent lost while apartment units are vacant (usually in between tenants) and rent not paid by existing tenants. VCL estimates are based on market averages, rather than specific historical data from the subject property. Losses for any one building may be indicative of quality of management, rather than of the market forces. VCL is subtracted from potential gross income.

Operating expenses (OE), also subtracted from PGI, are expenses attributed to the production and maintenance of an income stream. There are typically three types of operating expenses: 1) fixed costs; 2) variable costs; and 3) replacement reserves. Fixed costs are expenses that do not fluctuate with occupancy rate or income. Fixed costs include property taxes, mortgage payments, and insurance. Variable costs are costs that fluctuate with occupancy rate or income. Variable costs include heat, electricity, and income taxes. Replacement reserves are amounts set aside for estimated annual expenses of short-lived items. Replacement reserves include funds for replacement of items such as refrigerators, dishwashers, and roofing. Sometimes these items are accounted for when purchased, under fixed or variable costs.

Potential gross income, plus miscellaneous income, less vacancy and collection loss, less operating expenses equal the property's net operating income (NOI).

$$\begin{array}{r}
 \text{PGI} \\
 + \text{ MI} \\
 - \text{ VCL} \\
 - \text{ OE} \\
 \hline
 = \text{ NOI}
 \end{array}$$

Example 6.2. A property's estimated potential gross income (PGI) is \$100,000. Miscellaneous income (MI) is estimated to be \$10,000. A vacancy and collection loss (VCL) of 5% (0.05) of PGI is applied to the property and estimated operating expenses (OE) are \$75,000. If the direct capitalization rate (R) is 8% (0.08), calculate the estimated value of the property.

$$\begin{array}{r}
 \text{PGI} \quad \$100,000 \\
 + \text{ MI} \quad \$10,000 \\
 - \text{ VCL} \quad \$5,000 \quad (\$100,000 \times 5\%) \\
 - \text{ OE} \quad \$75,000 \\
 \hline
 = \text{ NOI} \quad \$30,000
 \end{array}$$

$$V = I/R = \$30,000/8\% = \underline{\underline{\$375,000}}$$

You may sometimes see the term *effective gross income*. This is a subtotal amount before the deduction of operating expenses.

$$\text{PGI} + \text{MI} - \text{VCL} = \text{effective gross income (EGI)}$$

$$\text{EGI} - \text{OE} = \text{NOI}$$

Capitalization

Capitalization is the process of converting anticipated income from a property to a present value by dividing that income by an appropriate rate of return, called the capitalization rate. The two types of capitalization are direct capitalization and yield capitalization. The direct capitalization method incorporates the estimated income for the first year following the date of valuation. The yield capitalization method uses income estimates from multiple years following the valuation date. This text follows the easier of the two methods, direct capitalization.

When analyzing an income stream, investors commonly are concerned with two things:

1. The return of investment, or recapture of the initial amount of money invested; and
2. The return on investment, the amount of profit generated by the investment.

Say, for example, you wanted to know how much you needed to invest today to have \$5 profit at the end of one year. The investment opportunity you are offered will pay 5% interest.

The basic formula for the income approach to value is $V = I/R$, where V = value, I = income, and R = rate. In the above example, income is the return on investment (the amount of profit you want at the end of the year), rate is the interest rate, and value – the amount we are looking for – is the original investment.

$$V = I/R = \$5/0.05 = \$100$$

You will need to invest \$100 today if you want to have \$5 profit in one year at a 5% interest rate.

Applying this formula to the direct capitalization method, income (I) is the estimated income of a property over the following year, rate (R) is called the capitalization rate, and value (V) is the value estimate for the subject property.

Steps in the Direct Capitalization Process

1. Determine net operating income (I):

	Potential gross income (PGI)
Plus:	Miscellaneous income (MI)
Less:	Vacancy and collection losses (VCL)
Less:	<u>Operating expenses (OE)</u>
Equals:	Net Operating Income

2. Determine capitalization rate (R)

	Recapture rate
Plus:	Effective tax rate
Plus:	<u>Interest rate</u>
Equals:	Capitalization Rate

3. Compute value (V)

$$V = \text{Net operating income} / \text{capitalization rate} = I/R$$

If the valuation includes both land and buildings, you will need to follow these three steps for each, separating the land from the buildings and other improvements.

Determining the Capitalization Rate

There are three components in a capitalization rate for developed property. They are:

- discount rate
 1. mortgage interest rate = return on borrowed funds
 2. equity yield rate = return on investor's equityFor purposes of this text, we will assume that funds used for purchase of property are borrowed, meaning the discount rate will be equal to the mortgage interest rate.
- recapture rate
- effective tax rate

A capitalization rate for developed property has three components because the building and/or other improvements lose value over their useful life. Property that loses value over a period of time is sometimes referred to as either a wasting asset or a depreciable asset. Value is lost due to the deterioration of the improvements or loss of income through age.

When you are valuing land, the capitalization rate has two components:

- discount rate
- effective tax rate

There is no recapture rate applied to land, because – except in rare cases – land does not lose value.

The *discount rate* is made up of two separate rates, the return on borrowed money or the interest rate, and the return on investor's equity, a yield rate. The yield rate is the rate of return that is high enough to convince a person with cash to invest in income-producing property. The calculations in this text will assume that property is purchased

entirely with borrowed money and, therefore, the discount rate is equal to the interest rate (or mortgage interest rate) charged for borrowed money.

The *recapture rate* is the annual rate at which an investment is returned over the economic life of property. The recapture rate applies only to buildings and other improvements. Land is not subject to a recapture rate because it generally does not have a finite economic life and does not lose value. The recapture rate is the inverse of the economic life of the building. For example, if a building has an economic life of 25 years, the recapture rate is $1/25 = 0.04$ or 4%.

The *effective tax rate* is calculated by multiplying the municipal property tax (mill) rate by that municipality's declared ratio. For example, if the mill rate is 20.00 (\$20.00/\$1,000 property value, or 2%) and property in the municipality is assessed at 90% of market value, the effective rate is $2\% \times 90\%$, or $0.02 \times 0.90 = 0.018$, or 1.8%.

A capitalization rate for land will be lower than the corresponding rate for buildings because the building is a wasting asset and the capitalization rate must factor in the recapture of the value of the building lost over time.

Example 6.3. Christina, an investor, is considering purchasing an apartment building. The estimated remaining economic life of the building is 25 years, the current mortgage interest rate is 3.5%, the local mill rate is 11.0 and the municipality reports a 90% declared ratio. What are the capitalization rates for the land and for the building?

$R_{\text{land}} = \text{interest rate} + \text{effective tax rate}$

Interest rate = $3.5\% = 0.035$

Effective tax rate = local property tax rate \times declared ratio = 11 mills \times 90%
= $11 \times 0.90 = 9.9$ mills = 0.0099

$R_{\text{land}} = 0.035 + 0.0099 = \underline{0.0449 \text{ or } 4.49\%}$

$R_{\text{bldg}} = \text{interest rate} + \text{effective tax rate} + \text{recapture rate} = R_{\text{land}} + \text{recapture rate}$

Recapture rate = $1/\text{economic life} = 1/25 = 0.040$

$R_{\text{bldg}} = 0.0449 + 0.040 = \underline{0.0849 \text{ or } 8.49\%}$

Calculating Value

Sometimes, you can combine the capitalization rate for land and the capitalization rate for improvements to a blended rate that applies for the entire property. Alternately, an assessor will calculate the value of land and improvements separately. To create these separate values, the assessor must apportion income between the land and the buildings.

The basic capitalization value formula is: $V = I/R$. When applying different capitalization rates to land and buildings, the value of the total property becomes: $V = V_{\text{land}} + V_{\text{bldg}}$. Calculating value for each component, the basic equation breaks down as follows:

$$V = V_{\text{land}} + V_{\text{bldg}}$$

$$V_{\text{land}} = I_{\text{land}}/R_{\text{land}}$$

$$V_{\text{bldg}} = I_{\text{bldg}}/R_{\text{bldg}}$$

Therefore, $V = (I_{\text{land}}/R_{\text{land}}) + (I_{\text{bldg}}/R_{\text{bldg}})$

Example 6.4. Errol owns an apartment building that he would like to sell. Before selling, he would like to find out how much he can get for the property. He estimates that his net operating income for the next year will be \$50,000. Of that total, he estimates that 20% of his income is due to the land, since he has off-street parking for all tenants and can charge higher than average rent for the apartments. The municipal tax rate is 15 mills and the municipal declared ratio is 100%. The area mortgage interest rate is 3.75% and the remaining economic life of the building is 16 years. Calculate the total property value.

$$I_{\text{land}} = \$50,000 \times 20\% = \$10,000$$

$$\begin{aligned} R_{\text{land}} &= \text{effective tax rate} + \text{interest rate} = (15 \text{ mills} \times 100\%) + 3.75\% \\ &= .015 + .0375 = 0.0525 \text{ or } 5.25\% \end{aligned}$$

$$V_{\text{land}} = I_{\text{land}}/R_{\text{land}} = \$10,000/5.25\% = \$190,476$$

$$I_{\text{bldg}} = \$50,000 - \$10,000 = \$40,000$$

$$\begin{aligned} R_{\text{bldg}} &= \text{effective tax rate} + \text{interest rate} + \text{recapture rate} = 0.015 + 0.0375 + 1/16 \\ &= 0.0525 + 0.0625 = 0.115 \text{ or } 11.5\% \end{aligned}$$

$$V_{\text{bldg}} = I_{\text{bldg}}/R_{\text{bldg}} = \$40,000/11.5\% = \$347,826$$

$$V = V_{\text{land}} + V_{\text{bldg}} = \$190,476 + \$347,826 = \underline{\underline{\$538,302}}$$

Class Problems

Example 6.5. Bob, a developer, is planning to build an apartment building on a vacant parcel of land for sale. He wants to know if the project is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$35,000

MI = \$1,500

VCL = 3.5% of PGI

OE = \$8,750

Sale price of land = \$50,000

Economic life of proposed building = 40 years

Current mortgage interest rate = 4.0%

Local tax rate = 20 mills

Municipal declared ratio = 90%

What is the property value estimate, to the nearest \$1,000?

Example 6.6. Bob now wants to purchase an existing apartment building that is on the market for \$1.5 million. He wants to know if the property is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$25,000

MI = \$1,000

VCL = 3.5% of PGI

OE = \$5,000

Estimated land value = \$60,000

Remaining economic life of building = 20 years

Current mortgage interest rate = 3.5%

Local tax rate = 20 mills

Municipal declared ratio = 90%

Should Bob purchase this building?

Example 6.7. Bob, looking to expand his property holdings, wants to buy the large, single-family house next to his apartment building from Example 6.6. The owner of the house is asking \$250,000 for it and Bob expects to put another \$250,000 into the house to renovate it into apartments. Bob has put together the following estimates:

PGI = \$8,000
MI = \$600
VCL = 5% of PGI
OE = \$1,000
Estimated land value = \$20,000
Remaining economic life of building = 23 years
Current mortgage interest rate = 4.2%
Local tax rate = 20 mills
Municipal declared ratio = 85%

Should Bob make this investment?

Example 6.8. Bob, still not satisfied, wants to build an even bigger apartment building on a vacant parcel of land for sale. He wants to know if the project is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$100,000

MI = \$6,000

VCL = 5% of PGI

OE = \$25,000

Sale price of land = \$55,000

Economic life of proposed building = 40 years

Current mortgage interest rate = 4.5%

Local tax rate = 18 mills

Municipal declared ratio = 85%

What is the property value estimate, to the nearest \$1,000?

Answers on page 172

CHAPTER 7

SALES RATIO STUDIES

Introduction

The Maine Constitution requires, “all taxes upon real and personal estate, assessed by authority of this state, shall be apportioned and assessed equally according to the just value thereof.” In keeping with this constitutional provision, state of Maine law requires assessors to perform annual sales ratio studies (36 M.R.S. § 328(8)).

Beyond the legal requirement, sales ratio studies are the foundation of maintaining an equitable assessment base. Sales ratio studies are the primary administrative tool for establishing or reviewing municipal assessments. Regular studies comparing assessed values to sales, when done correctly, provide the assessor with information necessary for equalization programs, keeping assessments current and allowing an adequate defense of assessments coming under appeal.

Verification of Data

When undertaking a sales ratio study, it is important to use data representative of the market. All sales used in a sales ratio study must be unbiased sales, referred to as arms-length transactions.

An arm’s-length transaction is a sale between a willing and informed buyer and a willing and informed seller, neither under any undue pressure to buy or sell, with a price expressed in dollars. The property sold must have spent a reasonable amount of time available for sale and normal market conditions must exist. The buyer and seller must be unrelated. Foreclosure sales and sales between family members are typical examples of sales that are not arm’s-length transactions.

While there are many ways to collect information concerning the sale prices of property, the Real Estate Transfer Tax Declaration (RETTD), completed at the time of sale, is a frequently used source. If an assessor uses an RETTD in a sales ratio study, the assessor should verify the data is correct. One common verification tool is a sales qualification form completed by the buyer. Such a form, when completed, both documents and validates the data.

Once sales are verified, the assessor’s next step is to ensure the sales represent the property assessed. For example, a property may have been improved since the last assessment, but prior to the sale. This sale does not reflect the property as it existed at the time of assessment, and should be excluded from the sales ratio study. Other discrepancies may be:

- Change in use, such as residential to commercial;
- Personal property may be included in the selling price (a camp may include furnishings or a boat, etc.);
- Rezoning;
- Neighborhood changes;
- Sale of a portion of the land – a real estate split;
- Land is subject to encumbrances; or
- Land is classified as tree growth, farmland, or other current use.

Time Period for Sales

Sales in a sales ratio study should have occurred within a set of dates called the base period. The base period is the 12-month period from July 1 through June 30 that includes the April 1 assessment date for the year under review. For example, if an assessor is doing a sales ratio study for 2017, sales from July 1, 2016 through June 30, 2017 will be included.

A minimum of 12 sales are required for an adequate sales ratio study. If there aren't enough sales during the base period, an assessor can expand the sampling period to include sales during an 18-month period. In the above example, the expanded sales period would be April 1 2016 through September 30, 2017.

If the 18-month expanded sales period still does not provide 12 usable sales, the assessor can then include the sales during a two-year period. In the above example, the additionally expanded sales period would be January 1, 2016 through December 31, 2017.

If the market has changed during the period from which sales are collected, some sales may need to be adjusted to account for the change. If the market was static, then no adjustment will be needed.

If enough sales exist in the base period or expanded periods, an assessor may conduct segregated ratio studies. A segregated ratio study analyzes a certain type of property, such as waterfront or condominium. In certain circumstances, segregated ratio studies may be required.

Definitions

The following definitions refer to this set of numbers.

	Sales	Assessed Values	Sales Ratio	Deviation
#1	\$ 6,000	\$ 3,600	60%	12
#2	\$ 7,000	\$ 4,500	64%	8
#3	\$ 8,000	\$ 5,600	70%	2
#4	\$ 9,500	\$ 6,700	71%	1
#5	\$ 9,500	\$ 6,700	71%	1
#6	\$ 9,500	\$ 6,700	71%	1
#7	\$ 9,500	\$ 6,700	71%	1
#8	\$ 10,750	\$ 7,700	72%	0
#9	\$ 12,250	\$ 9,000	73%	1
#10	\$ 12,500	\$ 9,400	75%	3
#11	\$ 20,000	\$ 17,000	85%	13
#12	<u>\$ 26,000</u>	<u>\$ 25,000</u>	<u>96%</u>	<u>24</u>
	\$140,500	\$108,600		67

Assessed value. A property's assessed value is the value assigned to that property by the municipality, for purposes of calculating property tax.

Average deviation. Average deviation is calculated by summing the deviations of all the sales ratios in a ratio study and dividing that sum by the total number of sales ratios in that study. In the above example, the average deviation is calculated as:

$$67/12 = 5.6$$

Average ratio. The average ratio is calculated by summing the sales ratios in the central range of a ratio study (the central 70%, excluding the top 15% and the bottom 15%) and dividing that sum by the total number of sales ratios in the central range of that study. In the above example, the average ratio is calculated as:

$$(75 + 73 + 72 + 71 + 71 + 71 + 71 + 70)/8 = 574/8 = 71.75, \text{ rounded to } 72$$

Classification. Classification, abbreviated "class," is a specific type of property. For purposes of this text, we will use the classifications residential, land, condominium, or waterfront

Central range. Most of the calculations in a sales ratio study involve only a portion of the sales included in the study. The sales used for these calculations are called the

central range and the sales excluded are called the outliers. To determine the central range, you must arrange sales with the sales ratios from lowest to highest. The sales ratio is the assessed value divided by the sale price for each sale. The central range is the 70% of the sales in the middle of the sales ratio list ordered by ratio. The outliers are the sales not included in the central range. For the above example, the central range is calculated as:

$$12 \times 70\% = 8.4, \text{ rounded to } 8$$

The central 8 sales exclude the 2 highest sales ratio sales and the 2 lowest sales ratio sales, or sale #s 3 – 10

The number of outliers must be even, so it may be easier to calculate the number of outliers first, then determine the remaining central range.

Certified ratio. The certified ratio for a municipality is the overall ratio between assessed value and market value for all property in that municipality, as determined by the state, through an annual audit conducted by the Property Tax Division. A municipality's certified ratio and its declared ratio are ordinarily the same percentage.

Declared ratio. A municipality's declared ratio is the overall ratio of assessed value to market value for the entire municipality, as determined by the municipality and reported on the annual municipal valuation return. The declared ratio differs from the certified ratio in that the declared ratio is determined by the municipality, while the certified ratio is determined by the state and certified to the State Treasurer. Ordinarily the declared ratio and the certified ratio are the same percentage. The primary goal of a sales ratio study is to determine a municipality's assessment ratio, which is used for prorating benefits such as the homestead exemption and payments to the municipality such as reimbursements for the Business Equipment Tax Exemption program. Maine law requires that each municipality maintain an certified (assessment) ratio between 70% and 110% (36 M.R.S. § 327).

Deviation. The deviation for a single sale is equal to the absolute value of the difference between that property's sales ratio and the average ratio.

Mean. The mean, or arithmetic mean, is most commonly called the average. It is calculated by adding all of the values in a series and dividing the total by the number of items in that series. For the above set of sales, the mean is:

$$(\$26,000 + \$20,000 + \$12,500 + \$12,250 + \$10,750 + \$9,500 + \$9,500 + \$9,500 + \$9,500 + \$8,000 + \$6,000) / 11 = \$133,500 / 11 = \underline{\$12,136}$$

Median. The median value is the value at the midpoint of the range. The median is the value at which half of the samples are higher and half are lower. In the above set, the median is #6, \$9,500. When an even number of items are under study, the median is determined by averaging the two middle values. If the above set of numbers included

#12, a value of \$4,000, at the bottom, the two middle values would be #6 \$9,500 and #7 \$9,500. The median is then calculated as:

$$(\$9,500 + \$9,500) / 2 = \$9,500$$

Mode. The mode is the value occurring most frequently. In the above number set, the mode is \$9,500, since that value occurs four times, which is more often than any other number is repeated.

Outlier. Most of the calculations in a sales ratio study involve only a portion of the sales included in the study. The sales used for these calculations are called the central range and the sales excluded are called the outliers. To determine the outliers, you must arrange sales with the sales ratios from lowest to highest. The sales ratio is the assessed value divided by the sale price for each sale. The outliers are the 15% of sales with the highest sales ratios and the 15% of sales with the lowest sales ratios. Outliers are not the same as sales that are not arm's-length transactions. Outliers are arm's-length transactions that are included in the sales ratio study, but excluded for some of the calculations for the study. Some calculations, such as the weighted average, include the outliers. To calculate the outliers, multiply the number of sales in the study by 30% and round the result up to the next even number. For example, if you have a study containing 28 sales, 30% of that total equals 8.4. To get an equal number of outliers on both ends of the study, the total number of outliers must be even. Further, any outlier calculation resulting in a fractional number must be rounded up. In this example, 8.4 must be rounded up to 10 to exclude 5 sales at the top and 5 sales at the bottom of the study.

Quality rating. The quality rating for a municipality is calculated by dividing the average deviation by the average ratio and multiplying the result by 100. Quality rating is a measure of how accurate a municipality's assessments are. Maine law requires each municipality to maintain a quality rating of no higher than 20 (36 M.R.S. § 327). For the above example, the quality rating is calculated as:

$$(5.6 / 72) \times 100 = 7.8$$

Sales Ratio. The sales ratio is calculated by dividing a property's assessed value by its selling price. For example, in the above set, the sales ratio for the first sale listed is $\$20,000 / \$26,000 = 0.77$.

Weighted average. The weighted average is calculated by dividing the total assessed values by the total sales prices for all sales in a sales ratio. For the numbers above, the weighted average is calculated:

$$\text{Assessed Values} / \text{Sales} = \$98,100 / \$133,500 = \underline{0.7348} \text{ or } \underline{73.5\%}$$

Ratio Study Problems

The following pages include a ratio study example followed by ratio study problems. Each problem ratio study contains two or more classes of properties, which are further divided into separate “segregated” studies.

Example 7.1

Item No.	Class	Mo/Yr	Sales Price	Local Assessment	Ratio	Whole Number		Deviation
1	R	5/1	425,000	255,000	0.60	60	Outliers	17
2	R	4/1	435,000	269,700	0.62	62		15
3	R	9/1	350,000	220,500	0.63	63		14
4	R	2/1	219,000	142,500	0.65	65		12
5	1 R	3/1	335,000	224,500	0.67	67	67	10
6	2 R	7/1	394,900	268,700	0.68	68	68	9
7	3 R	7/1	287,000	201,000	0.70	70	70	7
8	4 R	11/1	225,000	160,000	0.71	71	71	6
9	5 R	6/1	195,000	138,500	0.71	71	71	6
10	6 R	4/1	315,000	226,800	0.72	72	72	5
11	7 R	10/1	272,000	201,200	0.74	74	74	3
12	8 R	3/1	255,500	189,000	0.74	74	74	3
13	9 R	5/1	322,000	241,500	0.75	75	75	2
14	10 R	1/1	345,000	258,700	0.75	75	75	2
15	11 R	4/1	415,000	311,200	0.75	75	75	2
16	12 R	5/1	235,000	181,000	0.77	77	77	0
17	13 R	12/1	279,000	217,600	0.78	78	78	1
18	14 R	11/1	328,500	262,400	0.80	80	80	3
19	15 R	9/1	244,000	197,500	0.81	81	81	4
20	16 R	7/1	259,000	215,000	0.83	83	83	6
21	17 R	10/1	265,000	225,000	0.85	85	85	8
22	18 R	3/1	295,000	250,800	0.85	85	85	8
23	19 R	4/1	316,000	274,900	0.87	87	87	10
24	20 R	9/1	339,000	295,000	0.87	87	87	10
25	R	2/1	288,500	259,600	0.90	90	Outliers	13
26	R	11/1	254,500	229,000	0.90	90		13
27	R	8/1	325,000	298,500	0.92	92		15
28	R	7/1	262,000	246,200	0.94	94		17
TOTALS			8,480,900	6,461,300			1535	221

Outliers	=	Total Sales x .15			
Weighted Average Ratio	=	Assessment ÷ Sale Price			
Average Ratio	=	Central Section Total ÷ Number of Items in Cental Section			
Average Deviation	=	Total of ALL Deviations ÷ Total of COUNT of SALES			
Quality Rating	=	Average Deviation ÷ Average Ratio			
Outliers	=	28	x	0.15	4.2
Weighted Average Ratio	=	6,461,300	÷	8,480,900	0.76
Average Ratio	=	1535	÷	20	77
Average Deviation	=	221	÷	28	7.9
Quality Rating	=	7.9	÷	77	0.10

Chapter 7 – Sales Ratio Studies

Problem 7.1 – sales ratio study. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	04/09		\$269,000	\$161,400	60%		
2		M	06/09		\$172,000	\$106,600	62%		
3		M	12/09		\$165,000	\$102,300	62%		
4		R	02/09		\$174,500	\$118,700	68%		
5		R	03/09		\$232,500	\$165,100	71%		
6		R	02/09		\$199,000	\$143,300	72%		
7	1	M	10/09		\$162,000	\$119,900	74%		
8	2	R	09/09		\$145,000	\$107,300	74%		
9	3	M	06/09		\$159,000	\$119,200	75%		
10	4	R	08/09		\$205,000	\$157,800	77%		
11	5	R	01/09		\$158,900	\$122,400	77%		
12	6	M	02/09		\$150,000	\$115,500	77%		
13	7	M	05/09		\$148,000	\$117,700	80%		
14	8	R	05/09		\$215,000	\$174,200	81%		
15	9	R	09/09		\$178,000	\$146,000	82%		
16	10	R	11/09		\$209,900	\$176,300	84%		
17	11	R	03/09		\$150,000	\$126,000	84%		
18	12	R	04/09		\$167,500	\$142,400	85%		
19	13	M	07/09		\$138,500	\$120,500	87%		
20	14	R	04/09		\$239,000	\$207,900	87%		
21	15	M	11/09		\$145,000	\$127,600	88%		
22	16	R	10/09		\$244,000	\$219,600	90%		
23	17	R	03/09		\$177,700	\$159,900	90%		
24	18	M	08/09		\$142,000	\$129,200	91%		
25	19	R	02/09		\$180,000	\$163,800	91%		
26	20	R	07/09		\$224,500	\$206,500	92%		
27	21	M	05/09		\$135,000	\$126,900	94%		
28	22	R	10/09		\$149,000	\$140,000	94%		
29	23	R	01/09		\$192,500	\$182,900	95%		
30	24	M	11/09		\$139,900	\$132,900	95%		
31	25	R	05/09		\$136,500	\$129,700	95%		
32	26	R	08/09		\$188,000	\$184,200	98%		
33	27	M	04/09		\$147,000	\$145,500	99%		
34	28	M	04/09		\$132,600	\$132,700	100%		
35		R	07/09		\$184,500	\$188,200	102%		
36		R	12/09		\$156,600	\$164,400	105%		
37		M	10/09		\$139,000	\$150,100	108%		
38		R	08/09		\$125,000	\$137,500	110%		
39		M	09/09		\$125,000	\$140,100	112%		
40		R	12/09		\$149,000	\$177,300	119%		

Weighted Average Ratio:

Average Ratio:

Average Deviation:

Quality Rating:

CLASSIFICATIONS

L=LAND

M=CONDOS

R=RESIDENTIAL

W=WATERFRONT

Chapter 7 – Sales Ratio Studies

Problem 7.2 – segregated ratio study for condominium sales from Problem 7.1.

Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		M	06/09		\$172,000	\$106,600	62%		
2		M	12/09		\$165,000	\$102,300	62%		
3	1	M	10/09		\$162,000	\$119,900	74%		
4	2	M	06/09		\$159,000	\$119,200	75%		
5	3	M	02/09		\$150,000	\$115,500	77%		
6	4	M	05/09		\$148,000	\$117,700	80%		
7	5	M	07/09		\$138,500	\$120,500	87%		
8	6	M	11/09		\$145,000	\$127,600	88%		
9	7	M	08/09		\$142,000	\$129,200	91%		
10	8	M	05/09		\$135,000	\$126,900	94%		
11	9	M	11/09		\$139,900	\$132,900	95%		
12	10	M	04/09		\$147,000	\$145,500	99%		
13	11	M	04/09		\$132,600	\$132,700	100%		
14		M	10/09		\$139,000	\$150,100	108%		
15		M	09/09		\$125,000	\$140,100	112%		
				Totals:					
Weighted Average Ratio:									
Average Ratio:									
Average Deviation:									
Quality Rating:									

Chapter 7 – Sales Ratio Studies

Problem 7.3 – segregated ratio study for residential property sales from Problem 7.1. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.	CLASS	MO/YR	SALE PRICE	ASSESSMENT	RATIO	DEV.
1	R	04/09	\$269,000	\$161,400	60%	
2	R	02/09	\$174,500	\$118,700	68%	
3	R	03/09	\$232,500	\$165,100	71%	
4	R	02/09	\$199,000	\$143,300	72%	
5	R	09/09	\$145,000	\$107,300	74%	
6	R	08/09	\$205,000	\$157,800	77%	
7	R	01/09	\$158,900	\$122,400	77%	
8	R	05/09	\$215,000	\$174,200	81%	
9	R	09/09	\$178,000	\$146,000	82%	
10	R	11/09	\$209,900	\$176,300	84%	
11	R	03/09	\$150,000	\$126,000	84%	
12	R	04/09	\$167,500	\$142,400	85%	
13	R	04/09	\$239,000	\$207,900	87%	
14	R	10/09	\$244,000	\$219,600	90%	
15	R	03/09	\$177,700	\$159,900	90%	
16	R	02/09	\$180,000	\$163,800	91%	
17	R	07/09	\$224,500	\$206,500	92%	
18	R	10/09	\$149,000	\$140,000	94%	
19	R	01/09	\$192,500	\$182,900	95%	
20	R	05/09	\$136,500	\$129,700	95%	
21	R	08/09	\$188,000	\$184,200	98%	
22	R	07/09	\$184,500	\$188,200	102%	
23	R	12/09	\$156,600	\$164,400	105%	
24	R	08/09	\$125,000	\$137,500	110%	
25	R	12/09	\$149,000	\$177,300	119%	
Totals:						
Weighted Average Ratio:						
Average Ratio:						
Average Deviation:						
Quality Rating:						

Chapter 7 – Sales Ratio Studies

Problem 7.4 – sales ratio study. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		L	12/09		\$48,900	\$22,000	45%		
2		L	04/09		\$46,000	\$22,100	48%		
3		L	03/09		\$39,700	\$19,500	49%		
4		R	09/09		\$315,500	\$167,200	53%		
5		L	06/09		\$65,000	\$35,800	55%		
6		R	11/09		\$258,000	\$149,600	58%		
7		L	09/09		\$40,000	\$24,000	60%		
8		L	10/09		\$49,000	\$29,900	61%		
9		L	02/09		\$52,000	\$32,200	62%		
10		R	02/09		\$226,500	\$140,400	62%		
11		R	05/09		\$278,900	\$175,700	63%		
12		R	12/09		\$198,000	\$126,700	64%		
13		L	09/09		\$45,000	\$28,800	64%		
14		R	08/09		\$269,000	\$172,200	64%		
15		R	02/09		\$205,000	\$133,000	65%		
16		L	05/09		\$34,500	\$22,400	65%		
17		R	05/09		\$188,000	\$124,000	66%		
18		R	04/09		\$322,000	\$212,500	66%		
19		L	07/09		\$43,000	\$28,500	66%		
20		L	07/09		\$38,000	\$25,800	68%		
21		R	06/09		\$164,500	\$111,900	68%		
22		L	08/09		\$42,000	\$28,600	68%		
23		R	11/09		\$305,000	\$210,500	69%		
24		R	02/09		\$139,000	\$97,000	70%		
25		R	01/09		\$297,500	\$208,200	70%		
26		R	10/09		\$162,500	\$115,400	71%		
27		R	03/09		\$292,000	\$210,200	72%		
28		L	06/09		\$32,500	\$23,400	72%		
29		R	08/09		\$178,000	\$131,700	74%		
30		L	04/09		\$37,000	\$27,700	75%		
31		L	03/09		\$34,900	\$26,500	76%		
32		R	01/09		\$195,000	\$150,000	77%		
33		R	05/09		\$270,000	\$207,900	77%		
34		R	12/09		\$284,900	\$222,200	78%		
35		R	08/09		\$136,000	\$108,800	80%		
36		R	11/09		\$265,000	\$225,200	85%		
37		R	03/09		\$142,500	\$128,300	90%		
38		R	09/09		\$162,000	\$153,900	95%		
Totals:									
Weighted Average Ratio:							CLASSIFICATIONS		
Average Ratio:							L=LAND		
Average Deviation:							M=CONDOS		
Quality Rating:							R=RESIDENTIAL		
							W=WATERFRONT		

Problem 7.5 – segregated ratio study for land sales from Problem 7.4. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		L	12/09		\$48,900	\$22,000	45%		
2		L	04/09		\$46,000	\$22,100	48%		
3		L	03/09		\$39,700	\$19,500	49%		
4		L	06/09		\$65,000	\$35,800	55%		
5		L	09/09		\$40,000	\$24,000	60%		
6		L	10/09		\$49,000	\$29,900	61%		
7		L	02/09		\$52,000	\$32,200	62%		
8		L	09/09		\$45,000	\$28,800	64%		
9		L	05/09		\$34,500	\$22,400	65%		
10		L	07/09		\$43,000	\$28,500	66%		
11		L	07/09		\$38,000	\$25,800	68%		
12		L	08/09		\$42,000	\$28,600	68%		
13		L	06/09		\$32,500	\$23,400	72%		
14		L	04/09		\$37,000	\$27,700	75%		
15		L	03/09		\$34,900	\$26,500	76%		
				Totals					
Weighted Average Ratio:									
Average Ratio:									
Average Deviation:									
Quality Rating:									

Chapter 7 – Sales Ratio Studies

Problem 7.6 – segregated ratio study for residential property sales from Problem 7.4. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	09/09		\$315,500	\$167,200	53%		
2		R	11/09		\$258,000	\$149,600	58%		
3		R	02/09		\$226,500	\$140,400	62%		
4		R	05/09		\$278,900	\$175,700	63%		
5		R	12/09		\$198,000	\$126,700	64%		
6		R	08/09		\$269,000	\$172,200	64%		
7		R	02/09		\$205,000	\$133,000	65%		
8		R	05/09		\$188,000	\$124,000	66%		
9		R	04/09		\$322,000	\$212,500	66%		
10		R	06/09		\$164,500	\$111,900	68%		
11		R	11/09		\$305,000	\$210,500	69%		
12		R	02/09		\$139,000	\$97,000	70%		
13		R	01/09		\$297,500	\$208,200	70%		
14		R	10/09		\$162,500	\$115,400	71%		
15		R	03/09		\$292,000	\$210,200	72%		
16		R	08/09		\$178,000	\$131,700	74%		
17		R	01/09		\$195,000	\$150,000	77%		
18		R	05/09		\$270,000	\$207,900	77%		
19		R	12/09		\$284,900	\$222,200	78%		
20		R	08/09		\$136,000	\$108,800	80%		
21		R	11/09		\$265,000	\$225,200	85%		
22		R	03/09		\$142,500	\$128,300	90%		
23		R	09/09		\$162,000	\$153,900	95%		
				Totals					
Weighted Average Ratio:									
Average Ratio:									
Average Deviation:									
Quality Rating:									

Chapter 7 – Sales Ratio Studies

Problem 7.7 – sales ratio study. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		W	06/09		\$427,500	\$171,000	40%		
2		W	07/09		\$376,000	\$150,400	40%		
3		R	03/09		\$259,000	\$106,200	41%		
4		W	11/09		\$419,000	\$175,900	42%		
5		R	10/09		\$249,000	\$109,600	44%		
6	1	W	02/09		\$400,000	\$180,100	45%		
7	2	W	05/09		\$365,000	\$171,500	47%		
8	3	R	05/09		\$245,000	\$117,600	48%		
9	4	W	04/09		\$395,000	\$189,600	48%		
10	5	R	10/09		\$222,500	\$111,300	50%		
11	6	W	09/09		\$399,000	\$203,500	51%		
12	7	W	02/09		\$445,000	\$235,800	53%		
13	8	W	12/09		\$386,900	\$212,800	55%		
14	9	W	04/09		\$355,000	\$195,200	55%		
15	10	W	07/09		\$349,000	\$198,900	57%		
16	11	R	06/09		\$214,500	\$128,700	60%		
17	12	W	11/09		\$389,000	\$241,200	62%		
18	13	W	12/09		\$345,500	\$214,200	62%		
19	14	R	03/09		\$188,000	\$122,200	65%		
20	15	W	02/09		\$375,000	\$243,700	65%		
21	16	R	06/09		\$139,000	\$94,500	68%		
22	17	W	06/09		\$333,000	\$229,800	69%		
23	18	R	04/09		\$177,900	\$124,500	70%		
24	19	R	08/09		\$227,000	\$163,400	72%		
25	20	R	10/09		\$199,000	\$149,200	75%		
26	21	R	07/09		\$195,000	\$154,000	79%		
27	22	R	05/09		\$134,500	\$110,300	82%		
28	23	R	04/09		\$250,000	\$210,000	84%		
29	24	R	06/09		\$148,000	\$125,800	85%		
30		R	12/09		\$164,500	\$141,500	86%		
31		R	09/09		\$132,000	\$116,200	88%		
32		R	11/09		\$129,000	\$117,400	91%		
33		R	07/09		\$142,500	\$131,100	92%		
34		R	04/09		\$130,000	\$123,500	95%		
				Totals					
Weighted Average Ratio:									
Average Ratio:									
Average Deviation:									
Quality Rating:									

Problem 7.8 – segregated ratio study for residential property sales from Problem 7.7. Determine the weighted average ratio, the number of outliers, the average ratio, the average deviation, and the quality rating for the sales data below.

[illegible]

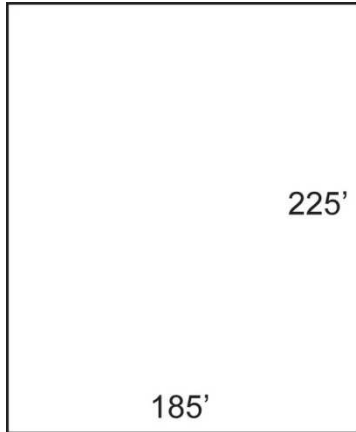
Chapter 7 – Sales Ratio Studies

Problem 7.9 – segregated ratio study for waterfront property sales from Problem 7.7. Determine the weighted average ratio, the average ratio, the average deviation, and the quality rating for the sales data below.

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		W	06/09		\$427,500	\$171,000	40%		
2		W	07/09		\$376,000	\$150,400	40%		
3		W	11/09		\$419,000	\$175,900	42%		
4		W	02/09		\$400,000	\$180,100	45%		
5		W	05/09		\$365,000	\$171,500	47%		
6		W	04/09		\$395,000	\$189,600	48%		
7		W	09/09		\$399,000	\$203,500	51%		
8		W	02/09		\$445,000	\$235,800	53%		
9		W	04/09		\$355,000	\$195,200	55%		
10		W	12/09		\$386,900	\$212,800	55%		
11		W	07/09		\$349,000	\$198,900	57%		
12		W	12/09		\$345,500	\$214,200	62%		
13		W	11/09		\$389,000	\$241,200	62%		
14		W	02/09		\$375,000	\$243,700	65%		
15		W	06/09		\$333,000	\$229,800	69%		
				Total					
Weighted Average Ratio:									
Average Ratio:									
Average Deviation:									
Quality Rating:									

Chapter 2 - Answers to Front Foot Value Examples

Example 2.2: Standard depth = 220ft; FFV = \$350/ft

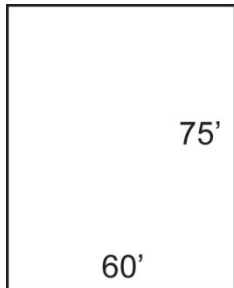


$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(225\text{ft}/220\text{ft})} = \sqrt{1.02} = 1.01 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$350/\text{ft} \times 1.01 = \$353.50/\text{ft}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$353.50/\text{ft} \times 185\text{ft} \\ &= \$65,397.50 \text{ rounded to } \underline{\underline{\$65,400}} \end{aligned}$$

Example 2.3: Standard depth = 150ft; FFV = \$225/ft

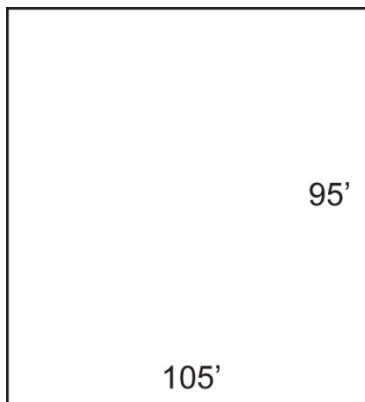


$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(75\text{ft}/150\text{ft})} = \sqrt{0.5} = 0.71 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$225/\text{ft} \times 0.71 = \$159.75/\text{ft}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$159.75/\text{ft} \times 60\text{ft} \\ &= \$9,585 \text{ rounded to } \underline{\underline{\$9,600}} \end{aligned}$$

Example 2.4: Standard depth = 250ft; FFV = \$425/ft

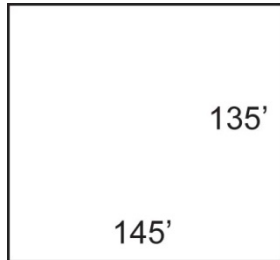


$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(95\text{ft}/250\text{ft})} = \sqrt{0.38} = 0.62 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$425/\text{ft} \times 0.62 = \$263.50/\text{ft}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$263.50/\text{ft} \times 105\text{ft} \\ &= \$27,668 \text{ rounded to } \underline{\underline{\$27,700}} \end{aligned}$$

Example 2.5: Standard depth = 125ft; FFV = \$150/ft



$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(135\text{ft}/125\text{ft})} = \sqrt{1.08} = 1.04 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$150/\text{ft} \times 1.04 = \$156/\text{ft}$$

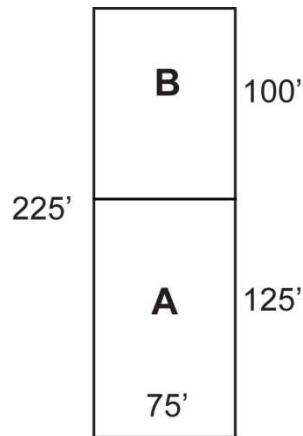
$$3) \text{ Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$156/\text{ft} \times 145\text{ft} = \$22,620 \text{ rounded to } \underline{\underline{\$22,600}}$$

Valuation of Rear Rectangular Parcels

The valuation of a rear rectangular parcel follows the same three step process as with rectangular parcels, but with one additional step. Rather than calculating one depth factor, we have to calculate two depth factors and use the difference between the two in the rear parcel valuation. The two depth factors to calculate are: 1) for the entire property; and 2) for the front parcel. The depth factor for the entire property (DF_{A+B}) less the depth factor for the front parcel (DF_A) equals the depth factor for the rear parcel (DF_B).

Calculate the value for parcel B for each of the properties below. Assume the street frontage is at the bottom of each diagram.

Example 2.6: Standard depth = 200ft; FFV = \$300/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(225\text{ft}/200\text{ft})} = \sqrt{1.13} = 1.06$$

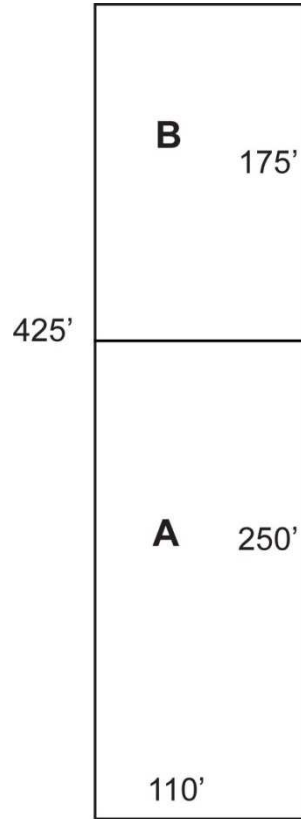
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(125\text{ft}/200\text{ft})} = \sqrt{0.63} = 0.79$$

$$DF_B = 1.06 - 0.79 = 0.27$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$300/\text{ft} \times 0.27 = \$81/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$81/\text{ft} \times 75\text{ft} = \$6,075 \\ \text{rounded to } \underline{\underline{\$6,100}}$$

Example 2.7: Standard depth = 220ft; FFV = \$175/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(425\text{ft}/220\text{ft})} = \sqrt{1.93} = 1.39$$

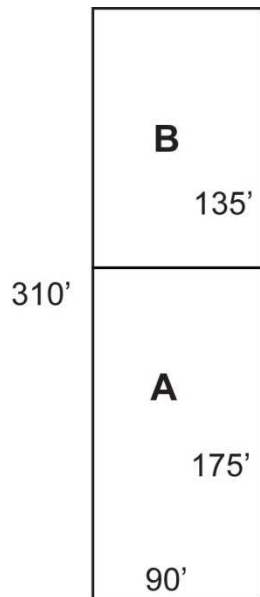
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(250\text{ft}/220\text{ft})} = \sqrt{1.14} = 1.07$$

$$DF_B = 1.39 - 1.07 = 0.32$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$175/\text{ft} \times 0.32 = \$56/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$56/\text{ft} \times 110\text{ft} = \$6,160 \\ \text{rounded to } \underline{\underline{\$6,200}}$$

Example 2.8: Standard depth = 150ft; FFV = \$175/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(310\text{ft}/150\text{ft})} = \sqrt{2.07} = 1.44$$

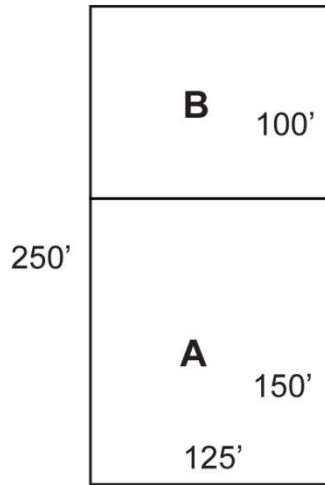
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(175\text{ft}/150\text{ft})} = \sqrt{1.17} = 1.08$$

$$DF_B = 1.44 - 1.08 = 0.36$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$175/\text{ft} \times 0.36 = \$63/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$63/\text{ft} \times 90\text{ft} = \$5,670 \\ \text{rounded to } \underline{\underline{\$5,700}}$$

Example 2.9: Standard depth = 125ft; FFV = \$275/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(250\text{ft}/125\text{ft})} = \sqrt{2.00} = 1.41$$

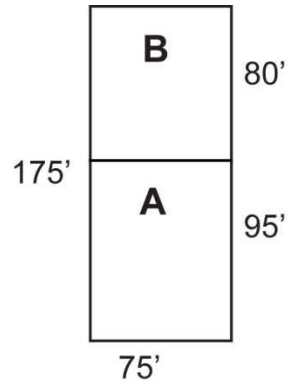
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(150\text{ft}/125\text{ft})} = \sqrt{1.20} = 1.10$$

$$DF_B = 1.41 - 1.10 = 0.31$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$275/\text{ft} \times 0.31 = \$85.25/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$85.25/\text{ft} \times 125\text{ft} = \\ \$10,656.25 \text{ rounded to } \underline{\underline{\$10,700}}$$

Example 2.10: Standard depth = 100ft; FFV = \$150/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(175\text{ft}/100\text{ft})} = \sqrt{1.75} = 1.32$$

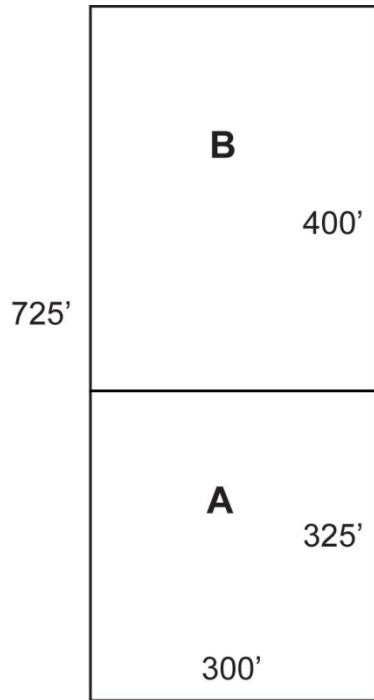
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(95\text{ft}/100\text{ft})} = \sqrt{0.95} = 0.97$$

$$DF_B = 1.32 - 0.97 = 0.35$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$150/\text{ft} \times 0.35 = \$52.50/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$52.50/\text{ft} \times 75\text{ft} = \\ \$3,937.50 \text{ rounded to } \underline{\underline{\$3,900}}$$

Example 2.11: Standard depth = 150ft; FFV = \$225/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(725\text{ft}/150\text{ft})} = \sqrt{4.83} = 2.20$$

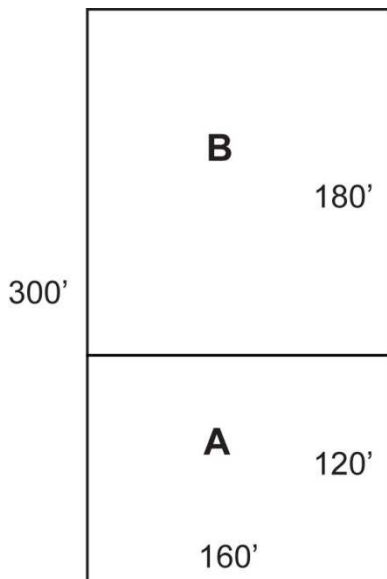
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(325\text{ft}/150\text{ft})} = \sqrt{2.17} = 1.47$$

$$DF_B = 2.20 - 1.47 = 0.73$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$225/\text{ft} \times 0.73 = \$164.25/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$164.25/\text{ft} \times 300\text{ft} = \$49,275 \text{ rounded to } \underline{\underline{\$49,300}}$$

Example 2.12: Standard depth = 125ft; FFV = \$150/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(300\text{ft}/125\text{ft})} = \sqrt{2.4} = 1.55$$

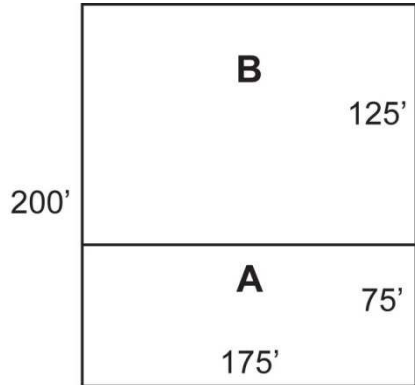
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(120\text{ft}/125\text{ft})} = \sqrt{0.96} = 0.98$$

$$DF_B = 1.55 - 0.98 = 0.57$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$150/\text{ft} \times 0.57 = \$85.50/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$85.50/\text{ft} \times 160\text{ft} = \$13,680 \text{ rounded to } \underline{\underline{\$13,700}}$$

Example 2.13: Standard depth = 200ft; FFV = \$175/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(200\text{ft}/200\text{ft})} = \sqrt{1.00} = 1.00$$

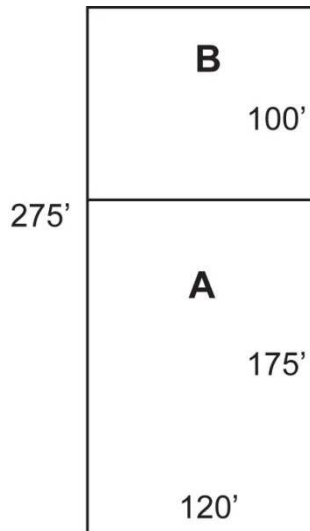
$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(75\text{ft}/200\text{ft})} = \sqrt{0.375} = 0.61$$

$$DF_B = 1.00 - 0.61 = 0.39$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$175/\text{ft} \times 0.39 = \$68.25/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$68.25/\text{ft} \times 175\text{ft} = \$11,943.75 \text{ rounded to } \underline{\underline{\$11,900}}$$

Example 2.14: Standard depth = 125ft; FFV = \$90/ft



$$1) DF_{A+B} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(275\text{ft}/125\text{ft})} = \sqrt{2.20} = 1.48$$

$$DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(175\text{ft}/125\text{ft})} = \sqrt{1.40} = 1.18$$

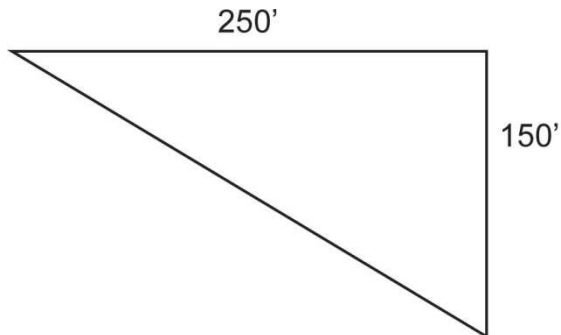
$$DF_B = 1.48 - 1.18 = 0.30$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF_B = \$90/\text{ft} \times 0.30 = \$27/\text{ft}$$

$$3) \text{Parcel B Value} = \text{ADJ FFV} \times \text{FF} = \$27/\text{ft} \times 120\text{ft} = \$3,240 \\ \text{rounded to } \underline{\underline{\$3,200}}$$

Valuation of Triangular Parcels

Example 2.16: Standard depth = 125ft; FFV = \$350/ft

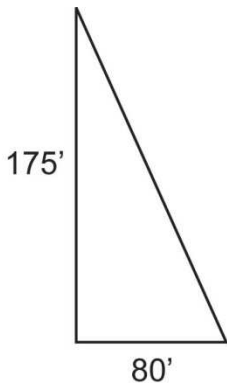


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(150\text{ft}/125\text{ft})} = \sqrt{1.20} = 1.10$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$350/\text{ft} \times 1.10 = \$385/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_N = \\ \$385/\text{ft} \times 250\text{ft} \times 0.30 = \$28,875 \text{ rounded to } \underline{\$28,900}$$

Example 2.17: Standard depth = 125ft; FFV = \$325/ft

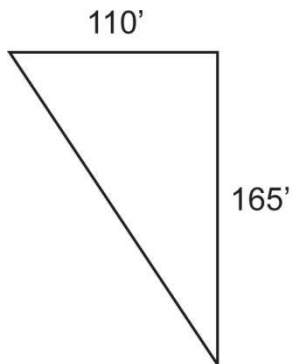


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(175\text{ft}/125\text{ft})} = \sqrt{1.40} = 1.18$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$325/\text{ft} \times 1.18 = \$383.50/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_D = \$383.50/\text{ft} \times 80\text{ft} \times 0.60 = \\ \$18,408 \text{ rounded to } \underline{\$18,400}$$

Example 2.18: Standard depth = 125ft; FFV = \$325/ft

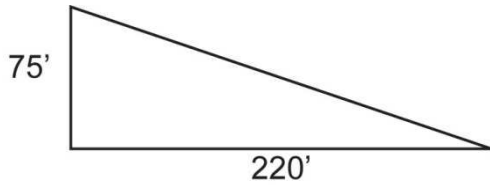


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(165\text{ft}/125\text{ft})} = \sqrt{1.32} = 1.15$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$325/\text{ft} \times 1.15 = \$373.75/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_N = \$373.75/\text{ft} \times 110\text{ft} \times \\ 0.30 = \$12,333.75 \text{ rounded to } \underline{\$12,300}$$

Example 2.19: Standard depth = 125ft; FFV = \$325/ft

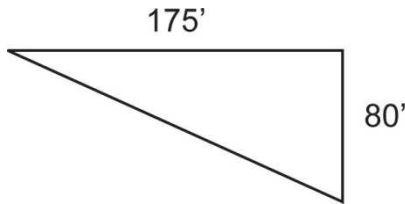


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(75\text{ft}/125\text{ft})} = \sqrt{0.60} = 0.77$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$325/\text{ft} \times 0.77 = \$250.25/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_D = \$250.25/\text{ft} \times 220\text{ft} \times 0.60 = \$33,033 \text{ rounded to } \underline{\underline{\$33,000}}$$

Example 2.20: Standard depth = 200ft; FFV = \$450/ft

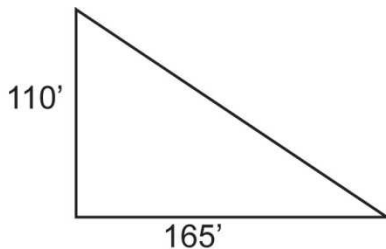


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(80\text{ft}/200\text{ft})} = \sqrt{0.4} = 0.63$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$450/\text{ft} \times 0.63 = \$283.50/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_N = \$283.50/\text{ft} \times 175\text{ft} \times 0.30 = \$14,883.75 \text{ rounded to } \underline{\underline{\$14,900}}$$

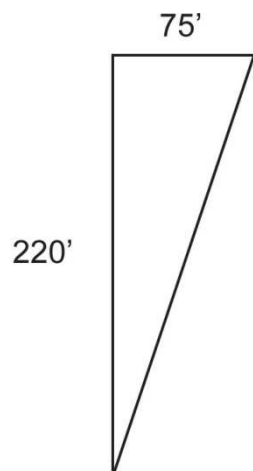
Example 2.21: Standard depth = 200ft; FFV = \$450/ft



$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(110\text{ft}/200\text{ft})} = \sqrt{0.55} = 0.74$$

$$2) \text{ADJ FFV} = \text{FFV} \times DF = \$450/\text{ft} \times 0.74 = \$333/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} \times \text{TF}_D = \$333/\text{ft} \times 165\text{ft} \times 0.30 = \$32,967 \text{ rounded to } \underline{\underline{\$33,000}}$$



Example 2.22: Standard depth = 200ft; FFV = \$450/ft

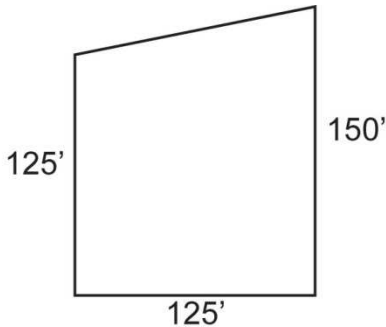
1) $DF = \sqrt{(\text{parcel depth}/\text{standard depth})}$
 $= \sqrt{(220\text{ft}/200\text{ft})} = \sqrt{1.10} = 1.05$

2) $ADJ \text{ FFV} = \text{FFV} \times DF = \$450/\text{ft} \times 1.05 = \$472.50/\text{ft}$

3) $\text{Parcel Value} = ADJ \text{ FFV} \times \text{FF} \times \text{TF}_N = \$472.50/\text{ft} \times 75\text{ft} \times 0.30 =$
 $\$10,631.25 \text{ rounded to } \underline{\underline{\$10,600}}$

Valuation of Trapezoidal Parcels

Example 2.24: Standard depth = 125ft; FFV = \$200/ft



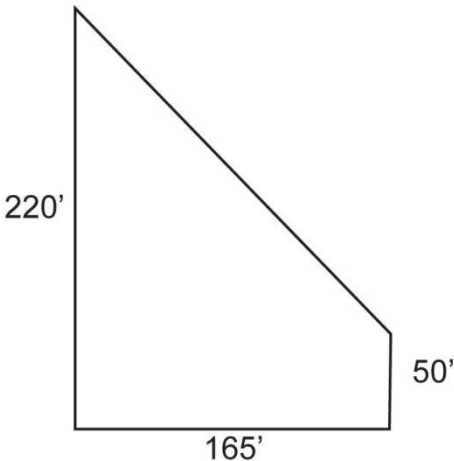
$$\text{Average depth} = (150\text{ft} + 125\text{ft})/2 = 275\text{ft}/2 = 137.5\text{ft}$$

$$1) \text{ DF} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(137.5\text{ft}/125\text{ft})} = \sqrt{1.10} = 1.05$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$200/\text{ft} \times 1.05 = \$210/\text{ft}$$

$$3) \text{ Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$210/\text{ft} \times 125\text{ft} = \$26,250 \text{ rounded to } \underline{\underline{\$26,200}}$$

Example 2.25: Standard depth = 150ft; FFV = \$325/ft



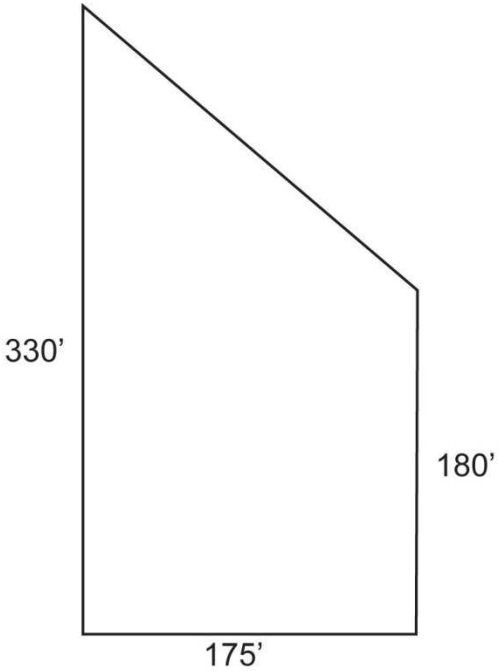
$$\text{Average depth} = (220\text{ft} + 50\text{ft})/2 = 270\text{ft}/2 = 135\text{ft}$$

$$1) \text{ DF} = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(135\text{ft}/150\text{ft})} = \sqrt{0.90} = 0.95$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$325/\text{ft} \times 0.95 = \$308.75/\text{ft}$$

$$3) \text{ Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$308.75/\text{ft} \times 165\text{ft} = \$50,943.75 \text{ rounded to } \underline{\underline{\$50,900}}$$

Example 2.26: Standard depth = 200ft; FFV = \$400/ft



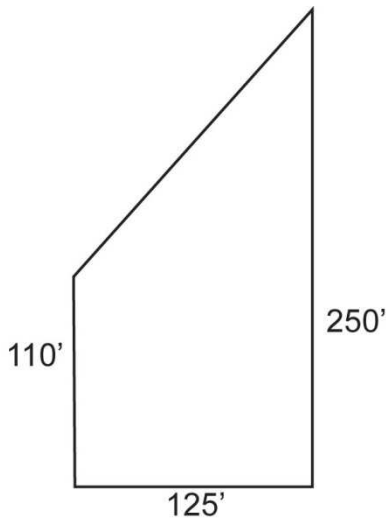
$$\text{Average depth} = (330\text{ft} + 180\text{ft})/2 = 510\text{ft}/2 = 255\text{ft}$$

$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(255/200\text{ft})} = \sqrt{1.27} = 1.13 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$400/\text{ft} \times 1.13 = \$452/\text{ft}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$452/\text{ft} \times 175\text{ft} \\ &= \underline{\underline{\$79,100}} \end{aligned}$$

Example 2.27: Standard depth = 100ft; FFV = \$225/ft



$$\text{Average depth} = (250\text{ft} + 110\text{ft})/2 = 360\text{ft}/2 = 180\text{ft}$$

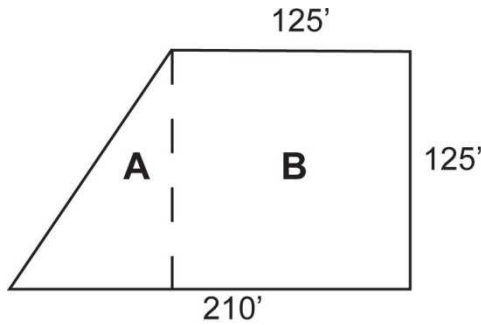
$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(180\text{ft}/100\text{ft})} = \sqrt{1.80} = 1.34 \end{aligned}$$

$$2) \text{ ADJ FFV} = \text{FFV} \times \text{DF} = \$225/\text{ft} \times 1.34 = \$301.50/\text{ft}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$301.50/\text{ft} \times 125\text{ft} = \\ &= \$37,687.50 \text{ rounded to } \underline{\underline{\$37,700}} \end{aligned}$$

The valuation of a trapezoidal parcel at an oblique angle to the street requires two separate parcel valuations, one for the rectangular portion and the other for the triangular portion. The total parcel valuation is the sum of these two separate calculations.

Example 2.28: Standard depth = 125ft; FFV = \$200/ft



$$1) DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(125\text{ft}/125\text{ft})} = \sqrt{1.00} = 1.00$$

$$2) \text{ADJ FFV}_A = \text{FFV} \times DF_A = \$200/\text{ft} \times 1.00 = \$200/\text{ft}$$

$$3) \text{Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_D = \$200/\text{ft} \times (210\text{ft} - 125\text{ft}) \times 0.60 = \$200/\text{ft} \times 85\text{ft} \times 0.60 = \underline{\$10,200}$$

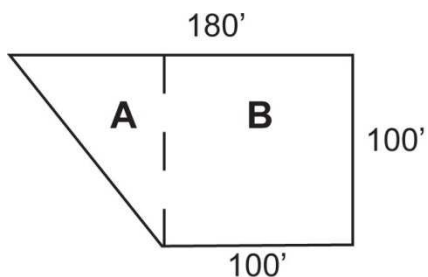
$$1) DF_B = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(125\text{ft}/125\text{ft})} = \sqrt{1.00} = 1.00$$

$$2) \text{ADJ FFV}_B = \text{FFV} \times DF_B = \$200/\text{ft} \times 1.00 = \$200/\text{ft}$$

$$3) \text{Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$200/\text{ft} \times 125\text{ft} = \underline{\$25,000}$$

$$\text{Parcel Value} = \text{Value}_A + \text{Value}_B = \$10,200 + \$25,000 = \underline{\$35,200}$$

Example 2.29: Standard depth = 125ft; FFV = \$240/ft



$$1) DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(100\text{ft}/125\text{ft})} = \sqrt{0.80} = 0.89$$

$$2) \text{ADJ FFV}_A = \text{FFV} \times DF_A = \$240/\text{ft} \times 0.89 = \$213.60/\text{ft}$$

$$3) \text{Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_N = \$213.60/\text{ft} \times (180\text{ft} - 100\text{ft}) \times 0.30 = \$213.60/\text{ft} \times 80\text{ft} \times 0.30 = \underline{\$5,126.40}$$

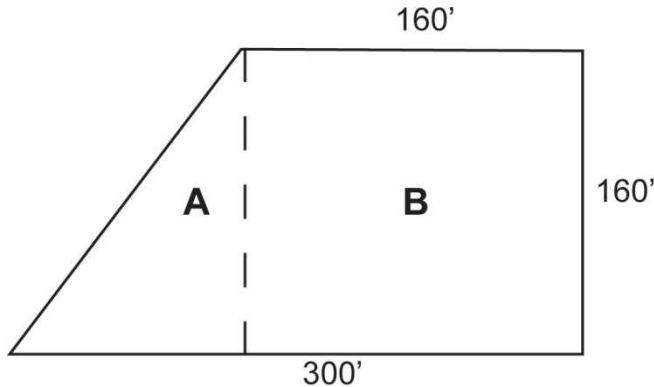
$$1) DF_B = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(100\text{ft}/125\text{ft})} = \sqrt{0.80} = 0.89$$

$$2) \text{ADJ FFV}_B = \text{FFV} \times DF_B = \$240/\text{ft} \times 0.89 = \$213.60/\text{ft}$$

$$3) \text{Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$213.60/\text{ft} \times 100\text{ft} = \underline{\$21,360}$$

Parcel Value = Value_A + Value_B = \$5,126.40 + \$21,360 = \$26,486.40 rounded to \$26,500

Example 2.30: Standard depth = 150ft; FFV = \$360/ft



$$1) DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(160\text{ft}/150\text{ft})} = \sqrt{1.07} = 1.03$$

$$2) \text{ADJ FFV}_A = \text{FFV} \times DF_A = \$360/\text{ft} \times 1.03 = \$370.80/\text{ft}$$

$$3) \text{Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_D = \$370.80/\text{ft} \times (300\text{ft} - 160\text{ft}) \times 0.60 = \$370.80/\text{ft} \times 140\text{ft} \times 0.60 = \underline{\$31,147.20}$$

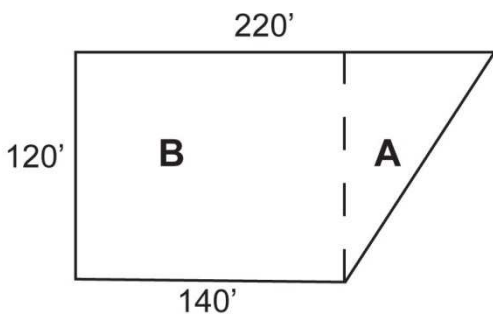
$$1) DF_B = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(160\text{ft}/150\text{ft})} = \sqrt{1.07} = 1.03$$

$$2) \text{ADJ FFV}_B = \text{FFV} \times DF_B = \$360/\text{ft} \times 1.03 = \$370.80/\text{ft}$$

$$3) \text{Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$370.80/\text{ft} \times 160\text{ft} = \underline{\$59,328}$$

Parcel Value = Value_A + Value_B = \$31,147.20 + \$59,328 = \$90,475.20 rounded to \$90,500

Example 2.31: Standard depth = 125ft; FFV = \$250/ft



$$1) DF_A = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(120\text{ft}/125\text{ft})} = \sqrt{0.96} = 0.98$$

$$2) \text{ADJ FFV}_A = \text{FFV} \times DF_A = \$250/\text{ft} \times 0.98 = \$245/\text{ft}$$

$$3) \text{Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_N = \$245/\text{ft} \times (220\text{ft} - 140\text{ft}) \times 0.30 = \$245/\text{ft} \times 80\text{ft} \times 0.30 =$$

\$5,880

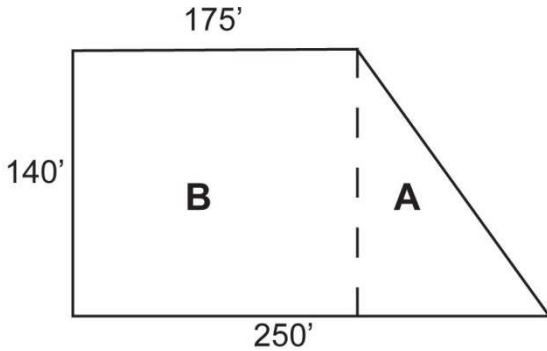
$$1) DF_B = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(120\text{ft}/125\text{ft})} = \sqrt{0.96} = 0.98$$

$$2) \text{ADJ FFV}_B = \text{FFV} \times DF_B = \$250/\text{ft} \times 0.98 = \$245/\text{ft}$$

$$3) \text{ Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$245/\text{ft} \times 140\text{ft} = \underline{\$34,300}$$

$$\text{Parcel Value} = \text{Value}_A + \text{Value}_B = \$5,880 + \$34,300 = \$40,180 \text{ rounded to } \underline{\$40,200}$$

Example 2.32: Standard depth = 100ft; FFV = \$425/ft



$$1) \text{ DF}_A = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(120\text{ft}/125\text{ft})} = \sqrt{1.4} = 1.18$$

$$2) \text{ ADJ FFV}_A = \text{FFV} \times \text{DF}_A = \$425/\text{ft} \times 1.18 = \$501.50/\text{ft}$$

$$3) \text{ Value}_A = \text{ADJ FFV}_A \times \text{FF}_A \times \text{TF}_D = \$501.50/\text{ft} \times (250\text{ft} - 175\text{ft}) \times 0.60 = \$501.50/\text{ft} \times 75\text{ft} \times 0.60 = \underline{\$22,567.50}$$

$$1) \text{ DF}_B = \sqrt{(\text{parcel depth}/\text{standard depth})} = \sqrt{(140\text{ft}/100\text{ft})} = \sqrt{1.4} = 1.18$$

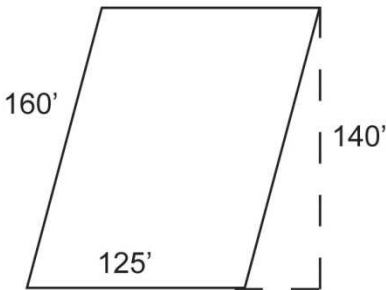
$$2) \text{ ADJ FFV}_B = \text{FFV} \times \text{DF}_B = \$425/\text{ft} \times 1.18 = \$501.50/\text{ft}$$

$$3) \text{ Value}_B = \text{ADJ FFV}_B \times \text{FF}_B = \$501.50/\text{ft} \times 175\text{ft} = \underline{\$87,762.50}$$

$$\text{Parcel Value} = \text{Value}_A + \text{Value}_B = \$22,567.50 + \$87,762.50 = \$110,330 \text{ rounded to } \underline{\$110,300}$$

Valuation of Parallelogram Parcels

Example 2.34: Standard depth = 125ft; FFV = \$330/ft

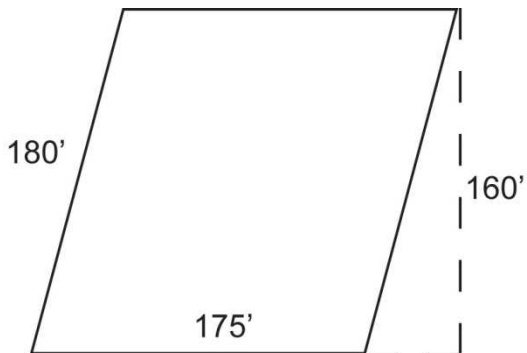


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(140\text{ft}/125\text{ft})} = \sqrt{1.12} = 1.06$$

$$2) \text{ADJ FFV} = \text{FFV} \times \text{DF} = \$330/\text{ft} \times 1.06 = \$349.80/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$349.80/\text{ft} \times 125\text{ft} \\ = \$43,725 \text{ rounded to } \underline{\$43,700}$$

Example 2.35: Standard depth = 200ft; FFV = \$450/ft

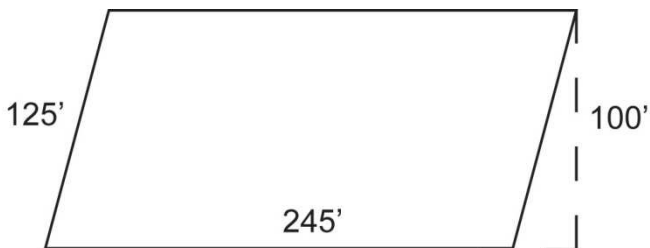


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(160\text{ft}/200\text{ft})} = \sqrt{0.80} = 0.89$$

$$2) \text{ADJ FFV} = \text{FFV} \times \text{DF} = \$450/\text{ft} \times 0.89 = \\ \$400.50/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} = \$400.50/\text{ft} \times 175\text{ft} \\ = \$70,087.50 \text{ rounded to } \underline{\$70,100}$$

Example 2.36: Standard depth = 150ft; FFV = \$250/ft

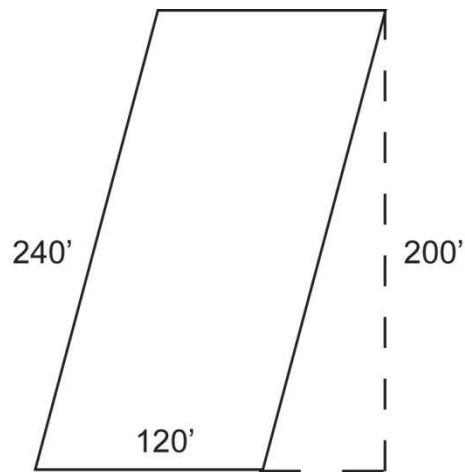


$$1) DF = \sqrt{(\text{parcel depth}/\text{standard depth})} \\ = \sqrt{(100\text{ft}/150\text{ft})} = \sqrt{0.67} = 0.82$$

$$2) \text{ADJ FFV} = \text{FFV} \times \text{DF} = \$250/\text{ft} \times 0.82 = \$205/\text{ft}$$

$$3) \text{Parcel Value} = \text{ADJ FFV} \times \text{FF} = \\ \$205/\text{ft} \times 245\text{ft} = \$50,225 \text{ rounded to } \underline{\$50,200}$$

Example 2.37: Standard depth = 100ft; FFV = \$150/ft



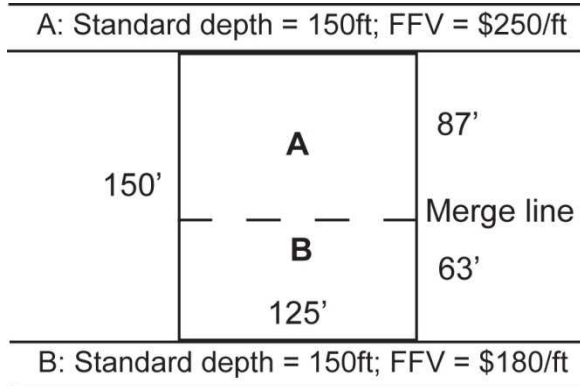
$$\begin{aligned} 1) \text{ DF} &= \sqrt{(\text{parcel depth}/\text{standard depth})} \\ &= \sqrt{(200\text{ft}/100\text{ft})} = \sqrt{2.00} = 1.41 \end{aligned}$$

$$\begin{aligned} 2) \text{ ADJ FFV} &= \text{FFV} \times \text{DF} = \$150/\text{ft} \times 1.41 = \\ & \$211.50/\text{ft} \end{aligned}$$

$$\begin{aligned} 3) \text{ Parcel Value} &= \text{ADJ FFV} \times \text{FF} = \$211.50/\text{ft} \times \\ & 120\text{ft} = \$25,380 \text{ rounded to } \underline{\underline{\$25,400}} \end{aligned}$$

Valuation of Parcels with Frontage on Two Streets

Example 2.39



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$250/ft + \$180/ft = 430$

b) Merge factor (MF) = $\text{Parcel depth} / FFV_{TOTAL} = 150ft / 430 = 0.35$

c) $\text{Merge line}_A = FFV_A \times MF = \$250/ft \times 0.35 = 87.$

$\text{Merge line}_B = FFV_B \times MF = \$180/ft \times 0.35 = 63.$

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth} / \text{standard depth})} = \sqrt{(87ft / 150ft)} = \sqrt{0.58} = 0.76$

2) $ADJ\ FFV = FFV \times DF = \$250/ft \times 0.76 = \$190/ft$

3) $\text{Lot Value} = ADJ\ FFV \times FF = \$190/ft \times 125ft = \underline{\$23,750}$

Value of Lot B:

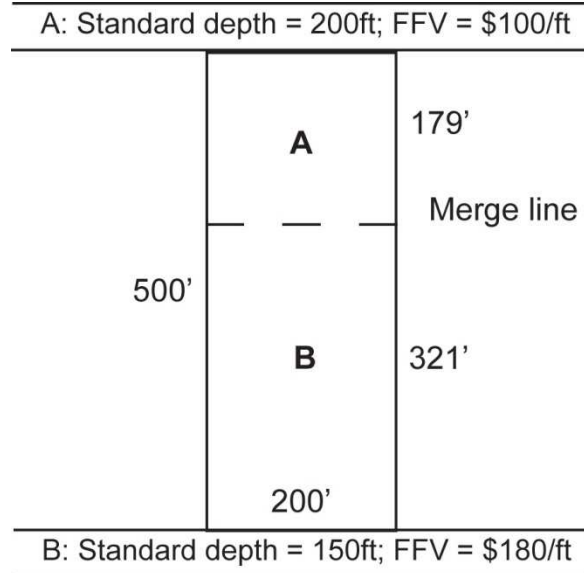
1) $DF = \sqrt{(\text{lot depth} / \text{standard depth})} = \sqrt{(63ft / 150ft)} = \sqrt{0.42} = 0.65$

2) $ADJ\ FFV = FFV \times DF = \$180/ft \times 0.65 = \$117/ft$

3) $\text{Lot Value} = ADJ\ FFV \times FF = \$117/ft \times 125ft = \underline{\$14,625}$

$\text{Parcel Value} = \text{Lot Value}_A + \text{Lot Value}_B = \$23,750 + \$14,625 = \$38,375 \text{ rounded to } \underline{\$38,400}$

Example 2.40



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$100/ft + \$180/ft = 280$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 500ft/280 = 1.79$

c) Merge line_A = $FFV_A \times MF = \$100/ft \times 1.79 = 179$.

Merge line_B = $FFV_B \times MF = \$180/ft \times 1.79 = 321$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(179ft/200ft)} = \sqrt{0.90} = 0.95$

2) $ADJ\ FFV = FFV \times DF = \$100/ft \times 0.95 = \$95/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$95/ft \times 200ft = \underline{\$19,000}$

Value of Lot B:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(321ft/150ft)} = \sqrt{2.14} = 1.46$

2) $ADJ\ FFV = FFV \times DF = \$180/ft \times 1.46 = \$262.80/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$262.80/ft \times 200ft = \underline{\$52,560}$

Parcel Value = Lot Value_A + Lot Value_B = $\$19,000 + \$52,560 = \$71,560$ rounded to $\$71,600$

Example 2.41

A: Standard depth = 200ft; FFV = \$50/ft		
600'	A	200'
	Merge line	
	B	400'
	200'	
B: Standard depth = 150ft; FFV = \$100/ft		

Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$50/ft + \$100/ft = 150$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 600ft/150 = 4.00$

c) Merge line_A = $FFV_A \times MF = \$50/ft \times 4.00 = 200$.

Merge line_B = $FFV_B \times MF = \$100/ft \times 4.00 = 400$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(200ft/200ft)} = \sqrt{1.00} = 1.00$

2) $ADJ\ FFV = FFV \times DF = \$50/ft \times 1.00 = \$50/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$50/ft \times 200ft = \underline{\$10,000}$

Value of Lot B:

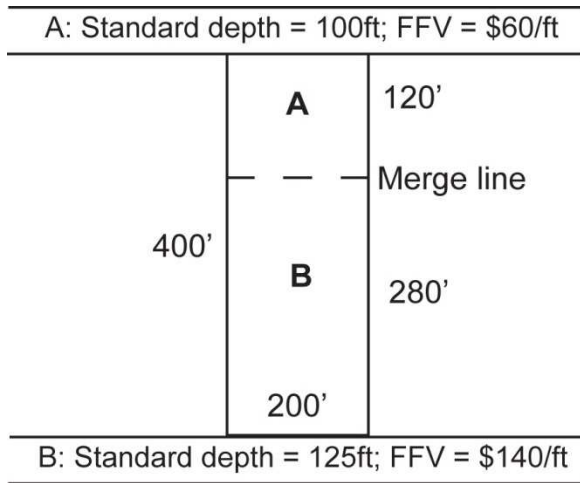
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(400ft/150ft)} = \sqrt{2.67} = 1.63$

2) $ADJ\ FFV = FFV \times DF = \$100/ft \times 1.63 = \$163/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$163/ft \times 200ft = \underline{\$32,600}$

Parcel Value = Lot Value_A + Lot Value_B = $\$10,000 + \$32,600 = \underline{\underline{\$42,600}}$

Example 2.42



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$60/ft + \$140/ft = 200$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 400ft/200 = 2.00$

c) Merge line_A = $FFV_A \times MF = \$60/ft \times 2.00 = 120$.

Merge line_B = $FFV_B \times MF = \$140/ft \times 2.00 = 280$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(120ft/100ft)} = \sqrt{1.20} = 1.10$

2) $ADJ\ FFV = FFV \times DF = \$60/ft \times 1.10 = \$66/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$66/ft \times 200ft = \underline{\$13,200}$

Value of Lot B:

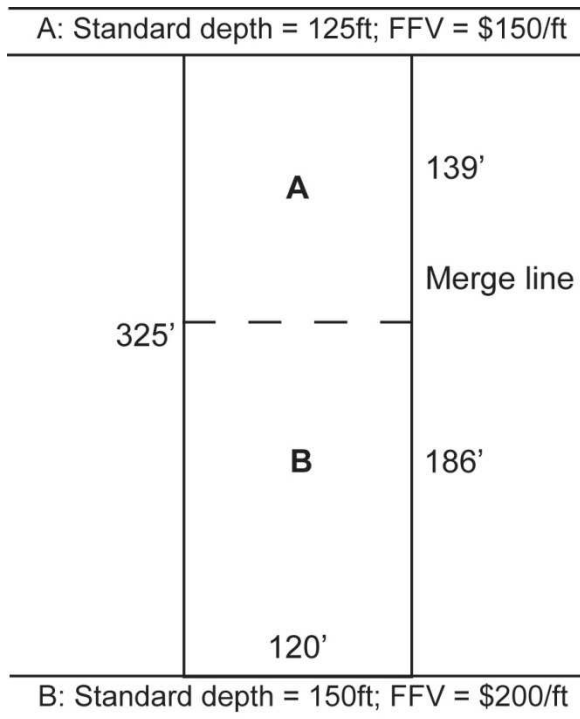
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(280ft/125ft)} = \sqrt{2.24} = 1.50$

2) $ADJ\ FFV = FFV \times DF = \$140/ft \times 1.50 = \$210/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$210/ft \times 200ft = \underline{\$42,000}$

Parcel Value = Lot Value_A + Lot Value_B = $\$13,200 + \$42,000 = \underline{\underline{\$55,200}}$

Example 2.43



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$150/ft + \$200/ft = 350$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 325ft/350 = 0.93$

c) Merge line_A = $FFV_A \times MF = \$150/ft \times 0.93 = 139$.

Merge line_B = $FFV_B \times MF = \$200/ft \times 0.93 = 186$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(139ft/125ft)} = \sqrt{1.11} = 1.05$

2) $ADJ\ FFV = FFV \times DF = \$150/ft \times 1.05 = \$157.50/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$157.50/ft \times 120ft = \underline{\$18,900}$

Value of Lot B:

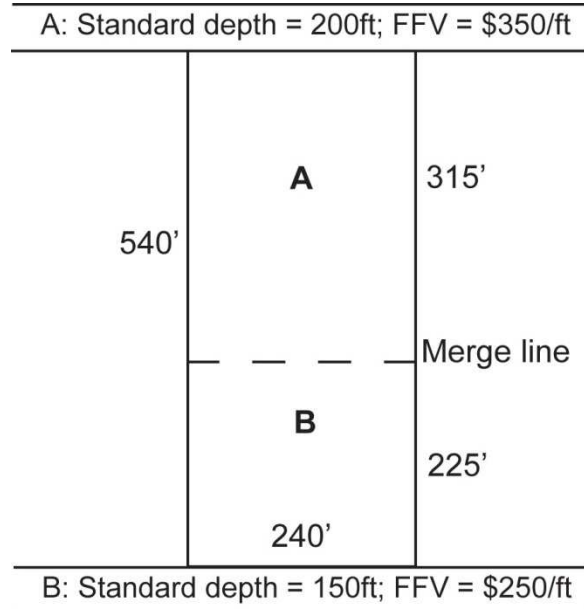
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(186ft/150ft)} = \sqrt{1.24} = 1.11$

2) $ADJ\ FFV = FFV \times DF = \$200/ft \times 1.11 = \$222/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$222/ft \times 120ft = \underline{\$26,640}$

Parcel Value = $\text{Lot Value}_A + \text{Lot Value}_B = \$18,900 + \$26,640 = \$45,540$ rounded to \$45,500

Example 2.44



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$350/ft + \$250/ft = 600$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 540ft/600 = 0.90$

c) Merge line_A = $FFV_A \times MF = \$350/ft \times 0.90 = 315$.

Merge line_B = $FFV_B \times MF = \$250/ft \times 0.90 = 225$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(315ft/200ft)} = \sqrt{1.58} = 1.25$

2) $ADJ\ FFV = FFV \times DF = \$350/ft \times 1.25 = \$437.50/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$437.50/ft \times 240ft = \underline{\$105,000}$

Value of Lot B:

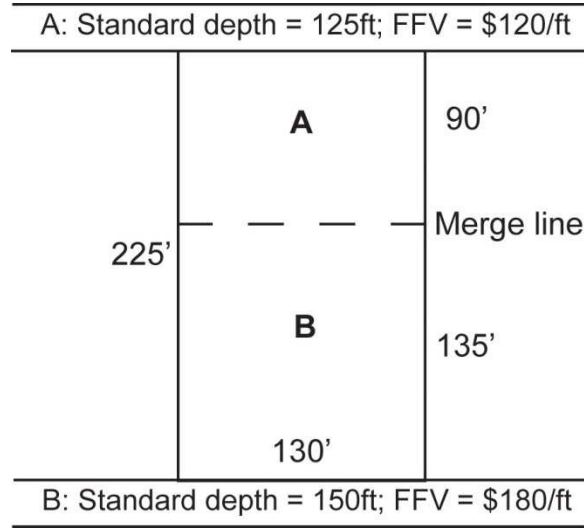
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(225ft/150ft)} = \sqrt{1.5} = 1.22$

2) $ADJ\ FFV = FFV \times DF = \$250/ft \times 1.22 = \$305/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$305/ft \times 240ft = \underline{\$73,200}$

Parcel Value = Lot Value_A + Lot Value_B = $\$105,000 + \$73,200 = \underline{\underline{\$178,200}}$

Example 2.45



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$120/ft + \$180/ft = 300$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 225ft/300 = 0.75$

c) Merge line_A = $FFV_A \times MF = \$120/ft \times 0.75 = 90$.

Merge line_B = $FFV_B \times MF = \$180/ft \times 0.75 = 135$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(90ft/125ft)} = \sqrt{0.72} = 0.85$

2) $ADJ\ FFV = FFV \times DF = \$120/ft \times 0.85 = \$102/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$102/ft \times 130ft = \underline{\$13,260}$

Value of Lot B:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(135ft/150ft)} = \sqrt{0.90} = 0.95$

2) $ADJ\ FFV = FFV \times DF = \$180/ft \times 0.95 = \$171/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$171/ft \times 130ft = \underline{\$22,230}$

Parcel Value = Lot Value_A + Lot Value_B = $\$13,260 + \$22,230 = \$35,490$ rounded to **\$35,500**

Example 2.46

A: Standard depth = 150ft; FFV = \$225/ft		
450'	A	193'
	— — —	Merge line
	B	257'
	225'	
B: Standard depth = 200ft; FFV = \$300/ft		

Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$225/ft + \$300/ft = 525$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 450ft/525 = 0.86$

c) Merge line_A = $FFV_A \times MF = \$225/ft \times 0.86 = 193$.

Merge line_B = $FFV_B \times MF = \$300/ft \times 0.86 = 257$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(193ft/150ft)} = \sqrt{1.29} = 1.13$

2) $ADJ\ FFV = FFV \times DF = \$225/ft \times 1.13 = \$254.25/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$254.25/ft \times 225ft = \underline{\$57,206.25}$

Value of Lot B:

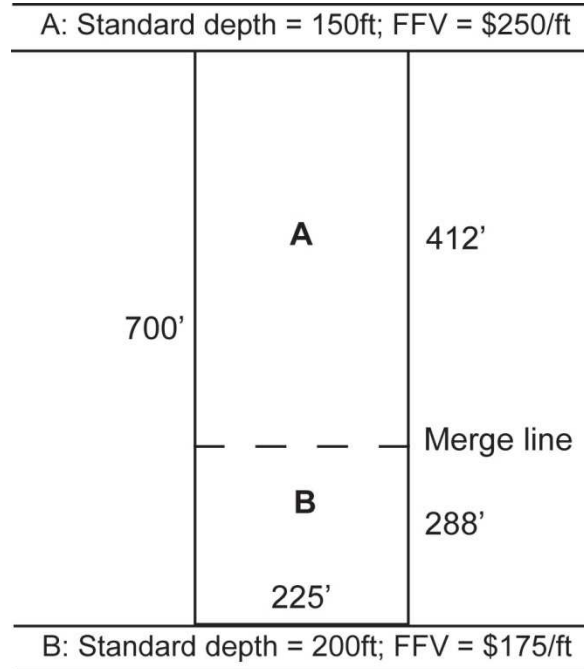
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(257ft/200ft)} = \sqrt{1.29} = 1.13$

2) $ADJ\ FFV = FFV \times DF = \$300/ft \times 1.13 = \$339/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$339/ft \times 225ft = \underline{\$76,275}$

Parcel Value = Lot Value_A + Lot Value_B = $\$57,206.25 + \$76,275 = \$133,481.25$ rounded to $\$133,500$

Example 2.47



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$250/ft + \$175/ft = 425$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 700ft/425 = 1.65$

c) Merge line_A = $FFV_A \times MF = \$250/ft \times 1.65 = 412$.

Merge line_B = $FFV_B \times MF = \$175/ft \times 1.65 = 288$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(412ft/150ft)} = \sqrt{2.75} = 1.66$

2) $ADJ\ FFV = FFV \times DF = \$250/ft \times 1.66 = \$415/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$415/ft \times 225ft = \underline{\$93,375}$

Value of Lot B:

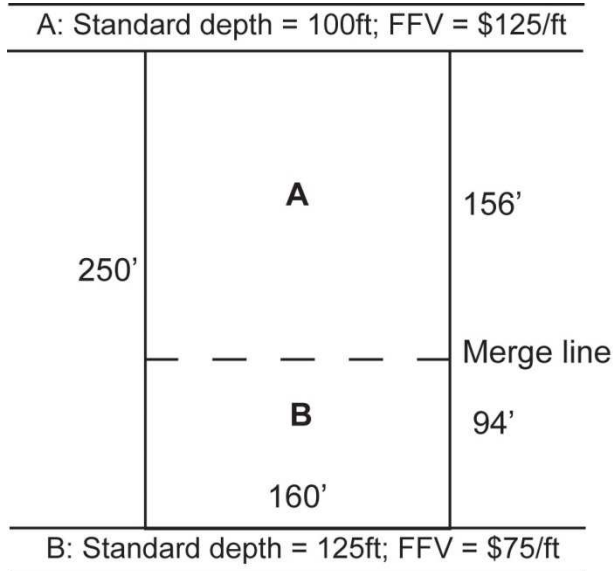
1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(288ft/200ft)} = \sqrt{1.44} = 1.2$

2) $ADJ\ FFV = FFV \times DF = \$175/ft \times 1.2 = \$210/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$210/ft \times 225ft = \underline{\$47,250}$

Parcel Value = $\text{Lot Value}_A + \text{Lot Value}_B = \$93,375 + \$47,250 = \$140,625$ rounded to **\$140,600**

Example 2.48



Merge line:

a) $FFV_{TOTAL} = FFV_A + FFV_B = \$125/ft + \$75/ft = 200$

b) Merge factor (MF) = Parcel depth/ $FFV_{TOTAL} = 250ft/200 = 1.25$

c) Merge line_A = $FFV_A \times MF = \$125/ft \times 1.25 = 156$.

Merge line_B = $FFV_B \times MF = \$75/ft \times 1.25 = 94$.

Value of Lot A:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(156ft/100ft)} = \sqrt{1.56} = 1.25$

2) $ADJ\ FFV = FFV \times DF = \$125/ft \times 1.25 = \$156.25/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$156.25/ft \times 160ft = \underline{\$25,000}$

Value of Lot B:

1) $DF = \sqrt{(\text{lot depth}/\text{standard depth})} = \sqrt{(94ft/125ft)} = \sqrt{0.75} = 0.87$

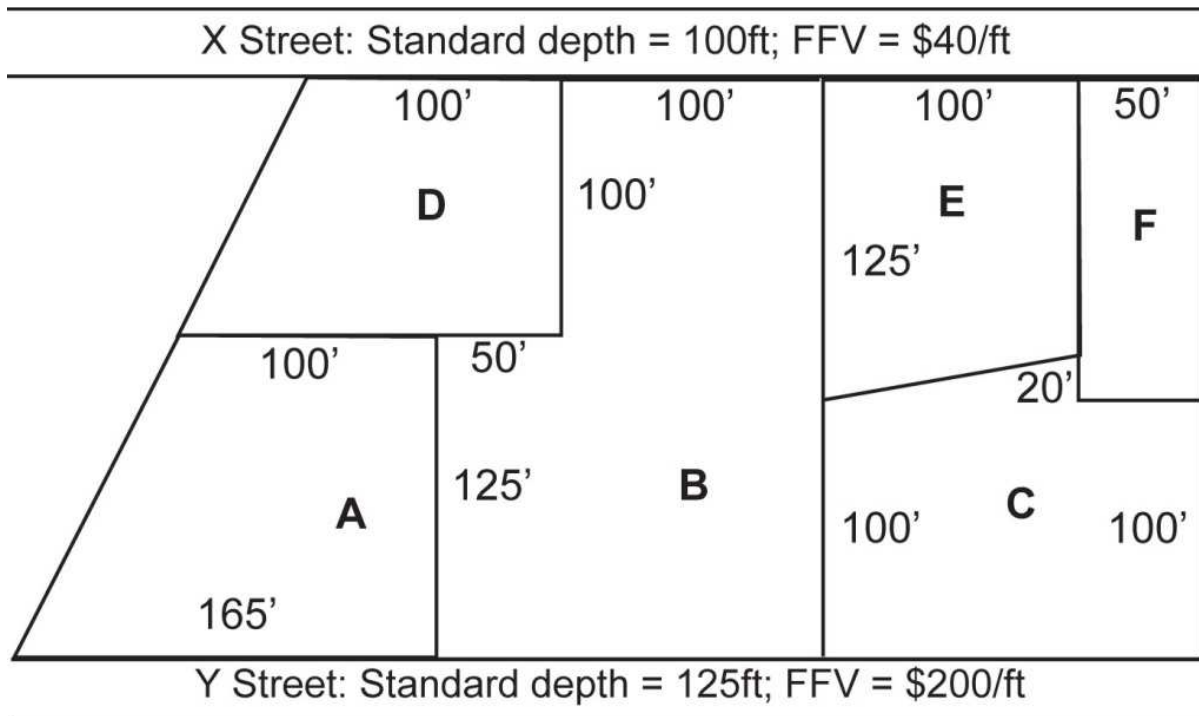
2) $ADJ\ FFV = FFV \times DF = \$75/ft \times 0.87 = \$65.25/ft$

3) Lot Value = $ADJ\ FFV \times FF = \$65.25/ft \times 160ft = \underline{\$10,440}$

Parcel Value = Lot Value_A + Lot Value_B = $\$25,000 + \$10,440 = \$35,440$ rounded to **\$35,400**

Value the Parcels Below, Using the Previous Methods

Example 2.49



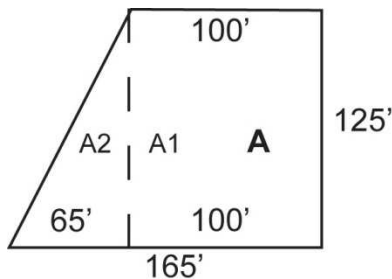
Parcel A: (oblique trapezoid – rectangle and delta triangle)

$$DF = \sqrt{125\text{ft}/125\text{ft}} = \sqrt{1.00} = 1.00, TF = 0.60$$

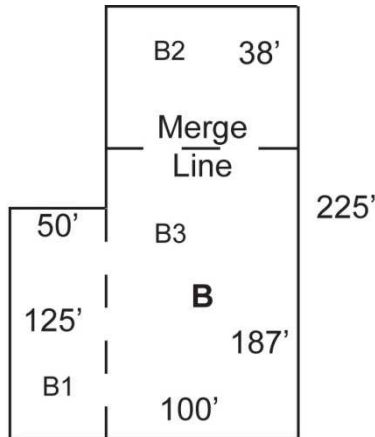
$A_1: \text{Value} = (\$200/\text{ft} \times 1.00) \times 100\text{ft} = \$200/\text{ft} \times 100\text{ft} = \underline{\$20,000}$

$$A_2: \text{Value} = (\$200/\text{ft} \times 1.00) \times 65\text{ft} \times 0.60 = \$200/\text{ft} \times 65\text{ft} \times 0.60 = \underline{\$7,800}$$

Parcel A Value = \$20,000 + \$7,800 = \$27,800



Parcel B: (odd shape – rectangle and parcel with frontage on two streets)



$$B_1: \quad DF_{B1} = \sqrt{(125\text{ft}/125\text{ft})} = \sqrt{1.00} = 1.00$$

$$\text{Value} = (\$200/\text{ft} \times 1.00) \times 50\text{ft} = \$200/\text{ft} \times 50\text{ft}$$

$$= \underline{\$10,000}$$

$$B_2: \quad ML_{B2} = \$40/\text{ft} \times (225\text{ft}/(\$40/\text{ft} + \$200/\text{ft}))$$

$$= \$40/\text{ft} \times (225\text{ft}/\$240/\text{ft}) = \$40/\text{ft} \times 0.9375\text{ft}^2/\$$$

$$= 37.5\text{ft rounded up to } 38\text{ft}$$

$$DF_{B2} = \sqrt{(38\text{ft}/100\text{ft})} = \sqrt{0.38} = 0.62$$

$$\text{Value} = (\$40/\text{ft} \times 0.62) \times 100\text{ft} = \$24.80/\text{ft} \times 100\text{ft}$$

$$= \underline{\$2,480}$$

$$B_3: \quad ML_{B3} = \$200/\text{ft} \times (225\text{ft}/(\$200/\text{ft} + \$40/\text{ft}))$$

$$= \$200/\text{ft} \times 0.9375\text{ft}^2/\$ = 187.5\text{ft rounded down to } 187\text{ft}$$

(rounded down to make $ML_{B2} + ML_{B3} = \text{parcel depth}$)

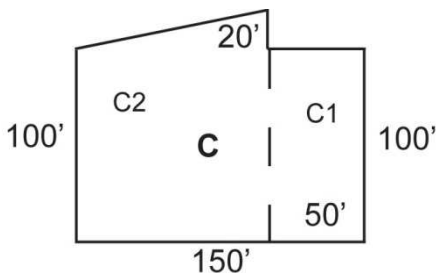
$$DF_{B3} = \sqrt{(187\text{ft}/125\text{ft})} = \sqrt{1.50} = 1.22$$

$$\text{Value} = (\$200/\text{ft} \times 1.22) \times 100\text{ft} = \$244/\text{ft} \times 100\text{ft} =$$

$$\underline{\$24,400}$$

Parcel B Value = \$10,000 + \$2,480 + \$24,400 = \$36,880 rounded to \$36,900

Parcel C: (odd shape – rectangle and perpendicular trapezoid)



$$C_1: \quad DF_{C1} = \sqrt{(100\text{ft}/125\text{ft})} = \sqrt{0.80} = 0.89$$

$$\text{Value} = (\$200/\text{ft} \times 0.89) \times 50\text{ft} = \$178/\text{ft} \times 50\text{ft}$$

$$= \underline{\$8,900}$$

$$C_2: \quad \text{Average depth} = (100\text{ft} + 120\text{ft})/2 = 110\text{ft}$$

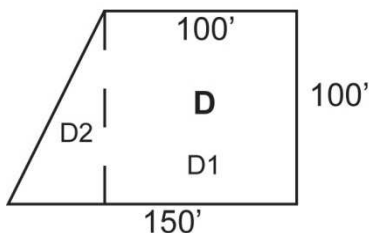
$$DF_{C2} = \sqrt{(110\text{ft}/125\text{ft})} = \sqrt{0.88} = 0.94$$

$$\text{Value} = (\$200/\text{ft} \times 0.94) \times 100\text{ft} = \$188/\text{ft} \times$$

$$100\text{ft} = \underline{\$18,800}$$

Parcel C Value = \$8,900 + \$18,800 = \$27,700

Parcel D: (oblique trapezoid – rectangle and oblique trapezoid)



$$DF = \sqrt{(100\text{ft}/100\text{ft})} = \sqrt{1.00} = 1.00; \text{TF} = 0.30$$

$$D_1: \quad \text{Value} = (\$40/\text{ft} \times 1.00) \times 100\text{ft} = \$40/\text{ft} \times 100\text{ft}$$

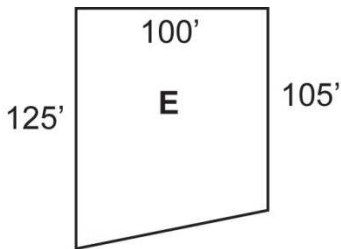
$$= \underline{\$4,000}$$

$$D_2: \quad \text{Value} = (\$40/\text{ft} \times 1.00) \times 50\text{ft} \times 0.30$$

$$= \$40/\text{ft} \times 50\text{ft} \times 0.30 = \underline{\$600}$$

Parcel D Value = \$4,000 + \$600 = \$4,600

Parcel E: (perpendicular trapezoid)

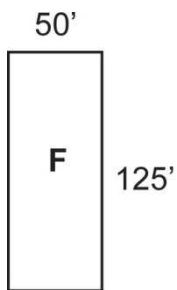


$$\text{Average depth} = (125\text{ft} + 105\text{ft})/2 = 115\text{ft}$$

$$\text{DF} = \sqrt{(115\text{ft}/100\text{ft})} = \sqrt{1.15} = 1.07$$

$$\text{Parcel E Value} = (\$40/\text{ft} \times 1.07) \times 100\text{ft} = \$42.80/\text{ft} \times 100\text{ft} = \underline{\underline{\$4,280}}$$

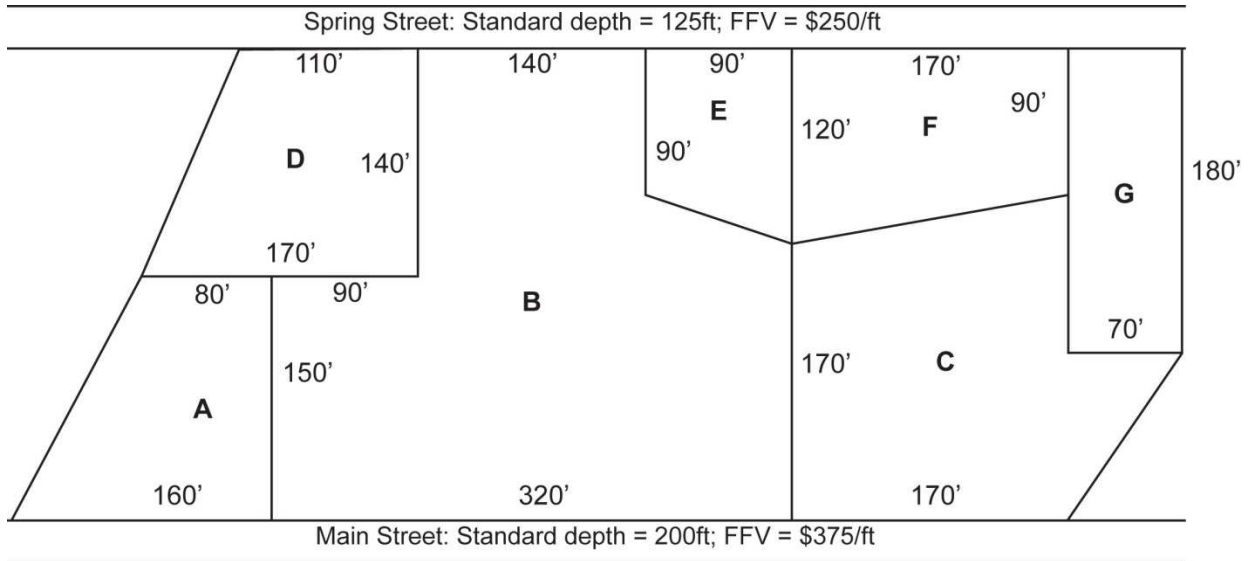
Parcel F: (rectangle)



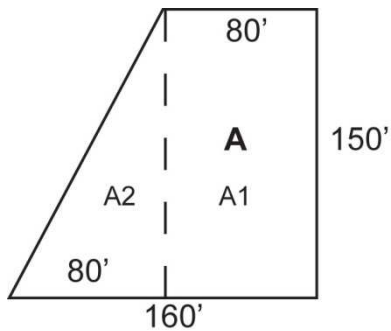
$$\text{DF} = \sqrt{(125\text{ft}/100\text{ft})} = \sqrt{1.25} = 1.12$$

$$\text{Parcel F Value} = (\$40/\text{ft} \times 1.12) \times 50\text{ft} = \$44.80/\text{ft} \times 50\text{ft} = \underline{\underline{\$2,240}}$$

Answers to Class Problems – Chapter 2



Parcel A: (oblique trapezoid with delta triangle)



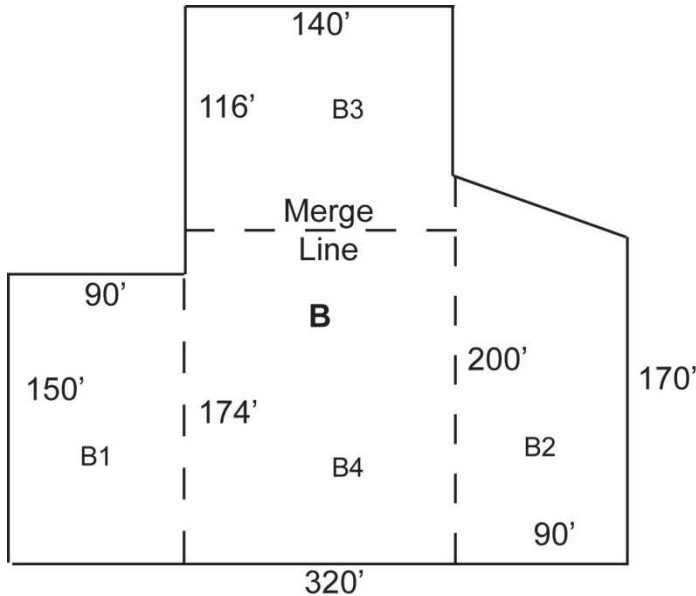
$$DF = \sqrt{(150\text{ft}/200\text{ft})} = \sqrt{0.75} = 0.87$$

$$A_1: \text{ Value} = (\$375/\text{ft} \times 0.87) \times 80\text{ft} = \$326.25 \times 80\text{ft} = \underline{\$26,100}$$

$$A_2: \text{ Value} = (\$375 \times 0.87) \times 80\text{ft} \times 0.60 = \$326.25 \times 80\text{ft} \times 0.60 = \underline{\$15,660}$$

$$\text{Parcel A Value} = \$26,100 + \$15,660 = \$41,760 \text{ rounded to } \underline{\$41,800}$$

Parcel B: (odd shape – rectangle, perpendicular trapezoid and parcel on two streets)



$$\begin{aligned} B_1: \quad DF &= \sqrt{(150\text{ft}/200\text{ft})} = \sqrt{0.75} \\ &= 0.87 \\ \text{Value} &= (\$375/\text{ft} \times 0.87) \times 90\text{ft} \\ &= \$326.25/\text{ft} \times 90\text{ft} \\ &= \underline{\$29,362.50} \end{aligned}$$

$$\begin{aligned} B_2: \quad \text{Average depth} &= (200\text{ft} + 170\text{ft})/2 = 185\text{ft} \\ DF &= \sqrt{(185\text{ft}/200\text{ft})} = \sqrt{0.93} \\ &= 0.96 \\ \text{Value} &= (\$375/\text{ft} \times 0.96) \times 90\text{ft} \\ &= \$360/\text{ft} \times 90\text{ft} = \underline{\$32,400} \end{aligned}$$

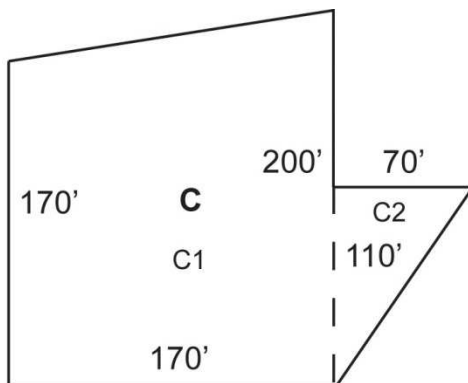
$$\begin{aligned} B_3: \quad ML &= \$250/\text{ft} \times (290\text{ft}/(\$250/\text{ft} + \$375/\text{ft})) \\ &= \$250/\text{ft} \times 0.464\text{ft}^2/\$ = 116\text{ft} \\ DF &= \sqrt{(116\text{ft}/125\text{ft})} = \sqrt{0.93} \\ &= 0.96 \end{aligned}$$

$$\text{Value} = (\$250/\text{ft} \times 0.96) \times 140\text{ft} = \$240/\text{ft} \times 140\text{ft} = \underline{\$33,600}$$

$$\begin{aligned} B_4: \quad ML &= \$375/\text{ft} \times 0.464\text{ft}^2/\$ = 174\text{ft} \\ DF &= \sqrt{(174\text{ft}/200\text{ft})} = \sqrt{0.87} = 0.93 \\ \text{Value} &= (\$375/\text{ft} \times 0.93) \times 140\text{ft} = \$348.75 \times 140 = \underline{\$48,825} \end{aligned}$$

Parcel B Value = \$29,362.50 + \$32,400 + \$33,600 + \$48,825 = \$144,187.50 rounded to \$144,200

Parcel C: (odd shape – perpendicular trapezoid and nabla triangle)

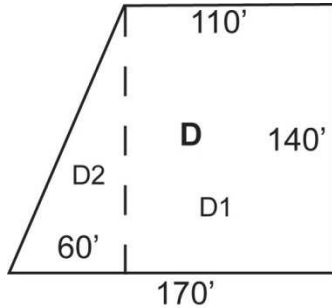


$$\begin{aligned} C_1: \quad \text{Average depth} &= (200\text{ft} + 170\text{ft})/2 = 185\text{ft} \\ DF &= \sqrt{(185\text{ft}/200\text{ft})} = \sqrt{0.93} = 0.96 \\ \text{Value} &= (\$375/\text{ft} \times 0.96) \times 170\text{ft} \\ &= \$360/\text{ft} \times 170\text{ft} = \underline{\$61,200} \end{aligned}$$

$$\begin{aligned} C_2: \quad DF &= \sqrt{(110\text{ft}/200\text{ft})} = \sqrt{0.55} = 0.74 \\ \text{Value} &= (\$375/\text{ft} \times 0.74) \times 70\text{ft} \times 0.30 \\ &= \$277.50/\text{ft} \times 70\text{ft} \times 0.30 = \underline{\$5,827.50} \end{aligned}$$

$$\begin{aligned} \text{Parcel C Value} &= \$61,200 + \$5,827.50 \\ &= \$67,027.50 \text{ rounded to } \underline{\$67,000} \end{aligned}$$

Parcel D: (oblique trapezoid – rectangle and nabla triangle)



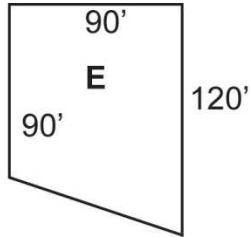
$$DF = \sqrt{(140\text{ft}/125\text{ft})} = \sqrt{1.12} = 1.06$$

$$\text{D1: Value} = (\$250/\text{ft} \times 1.06) \times 110\text{ft} = \$265/\text{ft} \times 110\text{ft} = \underline{\$29,150}$$

$$\text{D2: Value} = (\$250/\text{ft} \times 1.06) \times 60\text{ft} \times 0.30 = \$265/\text{ft} \times 60\text{ft} \times 0.30 = \underline{\$4,770}$$

$$\text{Parcel D Value} = \$29,150 + \$4,770 = \$33,920 \text{ rounded to } \underline{\$33,900}$$

Parcel E: (perpendicular trapezoid)

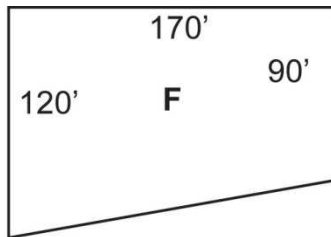


$$\text{Average depth} = (120\text{ft} + 90\text{ft})/2 = 105\text{ft}$$

$$DF = \sqrt{(105\text{ft}/125\text{ft})} = \sqrt{0.84} = 0.92$$

$$\text{Value} = (\$250/\text{ft} \times 0.92) \times 90\text{ft} = \$230/\text{ft} \times 90\text{ft} = \underline{\$20,700}$$

Parcel F: (perpendicular trapezoid)

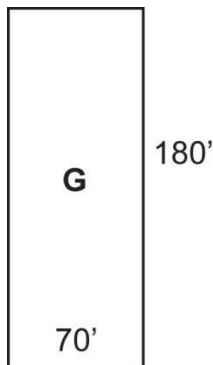


$$\text{Average depth} = (120\text{ft} + 90\text{ft})/2 = 105\text{ft}$$

$$DF = \sqrt{(105\text{ft}/125\text{ft})} = \sqrt{0.84} = 0.92$$

$$\text{Value} = (\$250 \times 0.92) \times 170\text{ft} = \$230/\text{ft} \times 170\text{ft} = \underline{\$39,100}$$

Parcel G: (rectangle)



$$DF = \sqrt{(180\text{ft}/125\text{ft})} = \sqrt{1.44} = 1.20$$

$$\text{Value} = (\$250/\text{ft} \times 1.20) \times 70\text{ft} = \$300/\text{ft} \times 70\text{ft} = \underline{\$21,000}$$

Chapter 5 - Answer to Comparative Market Analysis Example

Example 5.2: Comparative Market Analysis

<u>Elements</u>	<u>Subject</u>	<u>Comp 1</u>	<u>Comp 2</u>	<u>Comp 3</u>
Sale Price	-----	\$159,900	\$178,000	\$195,000
Location/site Adjustment	Typical -----	Typical -----	Typical -----	Above avg (\$5,000)
Age/condition Adjustment	22yrs/good -----	28yrs/avg \$7,500	20yrs/good -----	20yrs/good -----
Size Adjustment	1,040sf -----	960sf \$2,800	1,144sf (\$3,640)	1,232sf (\$6,720)
Basement Adjustment	Full/50% -----	Full/100% (\$3,000)	Full/0% \$3,000	Full/25% \$1,500
Deck Adjustment	OP/Deck -----	Deck \$2,500	EP/Deck (\$1,500)	OP/Deck -----
Garage Adjustment	One-car -----	None \$5,000	One-car -----	Two-car (\$4,000)
# of Adjustments	-----	5	3	4
Net Adjustment	-----	\$14,800	(\$2,140)	(\$14,220)
Adjusted Sale Price	-----	\$174,700	\$175,860	\$180,780

Subject Value = \$176,000

Explanation: The adjusted price (rounded) for Comparable #2 is used for the subject property value because Comparable #2 had the fewest adjustments and the adjusted value fell between the adjusted values of the other two comparables, indicating a reliable estimate.

Calculations

- Size adjustment: The adjustment for size differences is \$35/sf
Comparable #1 is 80sf smaller than the subject (1,040sf – 960sf).
Adjustment = 80sf x \$35/sf = \$2,800 addition because comparable is smaller.
Comparable #2 is 104sf larger than the subject (1,144sf – 1,040sf).
Adjustment = 104sf x \$35/sf = \$3,640 subtraction because comparable is larger.
Comparable #3 is 192sf larger than the subject (1,232sf – 1,040sf).
Adjustment = 192sf x \$35/sf = \$6,720 subtraction because comparable is larger.
- Basement adjustment: All basements are full. Finish values: \$1,500 for 25%; \$3,000 for 50%; \$4,500 for 75%; \$6,000 for 100%. Subject is 50% finished.
Comparable #1 difference from subject =
100% - 50% = \$6,000 - \$3,000 = \$3,000 subtraction because comparable is better.
Comparable #2 difference from subject =
0% - 50% = \$0 - \$3,000 = \$3,000 addition because comparable is not as good.
Comparable #3 difference from subject =
25% - 50% = \$1,500 - \$3,000 = \$1,500 addition because comparable is not as good.
- Deck adjustment: Values: EP = \$4,000; OP = \$2,500; Deck = \$1,500. The subject has OP and Deck.
Comparable #1 difference from subject = Deck – (OP + Deck)
= OP = \$2,500 addition because comparable is not as good.
Comparable #2 difference from subject = (EP + Deck) – (OP + Deck) = EP – OP = \$4,000 - \$2,500 = \$1,500 subtraction because comparable is better.
- Garage adjustment: Values: One-car = \$5,000; Two-car = \$9,000. The subject has a one-car garage.
Comparable #1 difference from subject = No garage – one-car garage = \$0 - \$5,000 = \$5,000 addition because comparable is not as good.
Comparable #3 difference from subject = Two-car garage – one-car garage = \$9,000 - \$5,000 = \$4,000 subtraction because comparable is better.

Chapter 6 - Answer to Class Problems

Example 6.5. Bob, a developer, is planning to build an apartment building on a vacant parcel of land for sale. He wants to know if the project is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$35,000
 MI = \$1,500
 VCL = 3.5% of PGI
 OE = \$8,750
 Sale price of land = \$50,000
 Economic life of proposed building = 40 years
 Current mortgage interest rate = 4.0%
 Local tax rate = 20 mills
 Municipal declared ratio = 90%

What is the property value estimate, to the nearest \$1,000?

$$\begin{aligned}\text{NOI} &= \text{PGI} + \text{MI} - \text{VCL} - \text{OE} = \$35,000 + \$1,500 - (\$35,000 \times 0.035) - \$8,750 \\ &= \$35,000 + \$1,500 - \$1,225 - \$8,750 = \underline{\$26,525}\end{aligned}$$

$$\begin{aligned}\text{Effective tax rate} &= \text{local tax rate} \times \text{declared ratio} = 20 \text{ mills} \times 90\% = 0.020 \times 0.90 \\ &= \underline{0.018}\end{aligned}$$

$$\text{Recapture rate} = 1/\text{economic life} = 1/40 = \underline{0.025}$$

$$V_{\text{land}} = \underline{\$50,000}$$

$$R_{\text{land}} = \text{effective tax rate} + \text{interest rate} = 0.018 + 0.04 = \underline{0.058}$$

$$I_{\text{land}} = V_{\text{land}} \times R_{\text{land}} = \$50,000 \times 0.058 = \underline{\$2,900}$$

$$I_{\text{bldg}} = \text{NOI} - I_{\text{land}} = \$26,525 - \$2,900 = \underline{\$23,625}$$

$$R_{\text{bldg}} = \text{effective tax rate} + \text{interest rate} + \text{recapture rate} = 0.018 + 0.04 + 0.025 = \underline{0.083}$$

$$\begin{aligned}V_{\text{total}} &= V_{\text{land}} + V_{\text{bldg}} = V_{\text{land}} + (I_{\text{bldg}}/R_{\text{bldg}}) = \$50,000 + (\$23,625/0.083) \\ &= \$50,000 + \$284,639 = \$334,639 \text{ or } \underline{\$335,000}\end{aligned}$$

Example 6.6. Bob now wants to purchase an existing apartment building that is on the market for \$200,000. He wants to know if the property is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$25,000
 MI = \$1,000
 VCL = 3.5% of PGI
 OE = \$5,000
 Estimated land value = \$60,000
 Remaining economic life of building = 20 years
 Current mortgage interest rate = 3.5%
 Local tax rate = 20 mills
 Municipal declared ratio = 90%

Should Bob purchase this building?

$$\begin{aligned}\text{NOI} &= \text{PGI} + \text{MI} - \text{VCL} - \text{OE} = \$25,000 + \$1,000 - (\$25,000 \times 0.035) - \$5,000 \\ &= \$25,000 + \$1,000 - \$875 - \$5,000 = \underline{\$20,125}\end{aligned}$$

$$\begin{aligned}\text{Effective tax rate} &= \text{local tax rate} \times \text{declared ratio} = 20 \text{ mills} \times 90\% = 0.020 \times 0.90 \\ &= \underline{0.018}\end{aligned}$$

$$\text{Recapture rate} = 1/\text{economic life} = 1/20 = \underline{0.05}$$

$$V_{\text{land}} = \underline{\$60,000}$$

$$R_{\text{land}} = \text{effective tax rate} + \text{interest rate} = 0.018 + 0.035 = \underline{0.053}$$

$$I_{\text{land}} = V_{\text{land}} \times R_{\text{land}} = \$60,000 \times 0.053 = \underline{\$3,180}$$

$$I_{\text{bldg}} = \text{NOI} - I_{\text{land}} = \$20,125 - \$3,180 = \underline{\$16,945}$$

$$R_{\text{bldg}} = \text{effective tax rate} + \text{interest rate} + \text{recapture rate} = 0.018 + 0.035 + 0.05 = \underline{0.103}$$

$$\begin{aligned}V_{\text{total}} &= V_{\text{land}} + V_{\text{bldg}} = V_{\text{land}} + (I_{\text{bldg}}/R_{\text{bldg}}) = \$60,000 + (\$16,945/0.103) \\ &= \$60,000 + \$164,515 = \underline{\underline{\$224,515; \text{Bob should buy this building}}}\end{aligned}$$

Example 6.7. Bob, looking to expand his property holdings, wants to buy the 8-unit apartment building next to his apartment building from Example 6.6. The owner of the house is asking \$100,000 for it. Bob has put together the following estimates:

PGI = \$8,000
 MI = \$600
 VCL = 5% of PGI
 OE = \$1,000
 Estimated land value = \$20,000
 Remaining economic life of building = 23 years
 Current mortgage interest rate = 4.2%
 Local tax rate = 20 mills
 Municipal declared ratio = 85%

Should Bob make this investment?

$$\begin{aligned}\text{NOI} &= \text{PGI} + \text{MI} - \text{VCL} - \text{OE} = \$8,000 + \$600 - (\$8,000 \times 0.05) - \$1,000 \\ &= \$8,000 + \$600 - \$400 - \$1,000 = \underline{\$7,200}\end{aligned}$$

$$\begin{aligned}\text{Effective tax rate} &= \text{local tax rate} \times \text{declared ratio} = 20 \text{ mills} \times 85\% = 0.020 \times 0.85 \\ &= \underline{0.017}\end{aligned}$$

$$\text{Recapture rate} = 1/\text{economic life} = 1/23 = \underline{0.043}$$

$$V_{\text{land}} = \underline{\$20,000}$$

$$R_{\text{land}} = \text{effective tax rate} + \text{interest rate} = 0.017 + 0.042 = \underline{0.059}$$

$$I_{\text{land}} = V_{\text{land}} \times R_{\text{land}} = \$20,000 \times 0.059 = \underline{\$1,180}$$

$$I_{\text{bldg}} = \text{NOI} - I_{\text{land}} = \$7,200 - \$1,180 = \underline{\$6,020}$$

$$R_{\text{bldg}} = \text{effective tax rate} + \text{interest rate} + \text{recapture rate} = 0.017 + 0.042 + 0.043 = \underline{0.102}$$

$$\begin{aligned}V_{\text{total}} &= V_{\text{land}} + V_{\text{bldg}} = V_{\text{land}} + (I_{\text{bldg}}/R_{\text{bldg}}) = \$20,000 + (\$6,020/0.102) \\ &= \$20,000 + \$59,020 = \underline{\$79,020; \text{Bob should not buy this building}}\end{aligned}$$

Example 6.8. Bob, still not satisfied, wants to build an even bigger apartment building on a vacant parcel of land for sale. He wants to know if the project is a good investment. To determine this, he needs an estimate of the property value including the land and building. Bob has put together the following estimates:

PGI = \$100,000
 MI = \$6,000
 VCL = 5% of PGI
 OE = \$25,000
 Sale price of land = \$55,000
 Economic life of proposed building = 40 years
 Current mortgage interest rate = 4.5%
 Local tax rate = 18 mills
 Municipal declared ratio = 85%

What is the property value estimate, to the nearest \$1,000?

$$\text{NOI} = \text{PGI} + \text{MI} - \text{VCL} - \text{OE} = \$100,000 + \$6,000 - (\$100,000 \times 0.05) - \$25,000 \\ = \$100,000 + \$6,000 - \$5,000 - \$25,000 = \underline{\$76,000}$$

$$\text{Effective tax rate} = \text{local tax rate} \times \text{declared ratio} = 18 \text{ mills} \times 85\% = 0.018 \times 0.85 \\ = \underline{0.015}$$

$$\text{Recapture rate} = 1/\text{economic life} = 1/40 = \underline{0.025}$$

$$V_{\text{land}} = \underline{\$55,000}$$

$$R_{\text{land}} = \text{effective tax rate} + \text{interest rate} = 0.015 + 0.045 = \underline{0.06}$$

$$I_{\text{land}} = V_{\text{land}} \times R_{\text{land}} = \$55,000 \times 0.06 = \underline{\$3,300}$$

$$I_{\text{bldg}} = \text{NOI} - I_{\text{land}} = \$76,000 - \$3,300 = \underline{\$72,700}$$

$$R_{\text{bldg}} = \text{effective tax rate} + \text{interest rate} + \text{recapture rate} = 0.015 + 0.045 + 0.025 = \underline{0.085}$$

$$V_{\text{total}} = V_{\text{land}} + V_{\text{bldg}} = V_{\text{land}} + (I_{\text{bldg}}/R_{\text{bldg}}) = \$55,000 + (\$72,700/0.085) \\ = \$55,000 + \$855,294 = \$910,294 \text{ or } \underline{\underline{\$910,000}}$$

Chapter 7 - Answer to Class Problems

Problem 7.1 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	04/09		\$269,000	\$161,400	60%	27	
2		M	06/09		\$172,000	\$106,600	62%	25	
3		M	12/09		\$165,000	\$102,300	62%	25	Outliers
4		R	02/09		\$174,500	\$118,700	68%	19	
5		R	03/09		\$232,500	\$165,100	71%	16	
6		R	02/09		\$199,000	\$143,300	72%	15	
7	1	M	10/09		\$162,000	\$119,900	74%	13	
8	2	R	09/09		\$145,000	\$107,300	74%	13	
9	3	M	06/09		\$159,000	\$119,200	75%	12	
10	4	R	08/09		\$205,000	\$157,800	77%	10	
11	5	R	01/09		\$158,900	\$122,400	77%	10	
12	6	M	02/09		\$150,000	\$115,500	77%	10	
13	7	M	05/09		\$148,000	\$117,700	80%	7	
14	8	R	05/09		\$215,000	\$174,200	81%	6	
15	9	R	09/09		\$178,000	\$146,000	82%	5	
16	10	R	11/09		\$209,900	\$176,300	84%	3	
17	11	R	03/09		\$150,000	\$126,000	84%	3	
18	12	R	04/09		\$167,500	\$142,400	85%	2	
19	13	M	07/09		\$138,500	\$120,500	87%	0	Mean
20	14	R	04/09		\$239,000	\$207,900	87%	0	87%
21	15	M	11/09		\$145,000	\$127,600	88%	1	
22	16	R	10/09		\$244,000	\$219,600	90%	3	
23	17	R	03/09		\$177,700	\$159,900	90%	3	
24	18	M	08/09		\$142,000	\$129,200	91%	4	
25	19	R	02/09		\$180,000	\$163,800	91%	4	
26	20	R	07/09		\$224,500	\$206,500	92%	5	
27	21	M	05/09		\$135,000	\$126,900	94%	7	
28	22	R	10/09		\$149,000	\$140,000	94%	7	
29	23	R	01/09		\$192,500	\$182,900	95%	8	
30	24	M	11/09		\$139,900	\$132,900	95%	8	
31	25	R	05/09		\$136,500	\$129,700	95%	8	
32	26	R	08/09		\$188,000	\$184,200	98%	11	
33	27	M	04/09		\$147,000	\$145,500	99%	12	
34	28	M	04/09		\$132,600	\$132,700	100%	13	2436
35		R	07/09		\$184,500	\$188,200	102%	15	
36		R	12/09		\$156,600	\$164,400	105%	18	
37		M	10/09		\$139,000	\$150,100	108%	21	Outliers
38		R	08/09		\$125,000	\$137,500	110%	23	
39		M	09/09		\$125,000	\$140,100	112%	25	
40		R	12/09		\$149,000	\$177,300	119%	32	
Totals:					\$6,850,600	\$5,889,500		449	
Weighted Average Ratio:			5889500 ÷ 6850600		86%				
Average Ratio:			2436 ÷ 28		87				
Average Deviation:			449 ÷ 40		11.2				
Quality Rating:			11.2 ÷ 87		13				

Answers to Class Problems – Chapter 7

Problem 7.2 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		M	06/09		\$172,000	\$106,600	62%	25	Outliers
2		M	12/09		\$165,000	\$102,300	62%	25	
3	1	M	10/09		\$162,000	\$119,900	74%	13	
4	2	M	06/09		\$159,000	\$119,200	75%	12	
5	3	M	02/09		\$150,000	\$115,500	77%	10	
6	4	M	05/09		\$148,000	\$117,700	80%	7	
7	5	M	07/09		\$138,500	\$120,500	87%	0	Mean
8	6	M	11/09		\$145,000	\$127,600	88%	1	87%
9	7	M	08/09		\$142,000	\$129,200	91%	4	
10	8	M	05/09		\$135,000	\$126,900	94%	7	
11	9	M	11/09		\$139,900	\$132,900	95%	8	
12	10	M	04/09		\$147,000	\$145,500	99%	12	
13	11	M	04/09		\$132,600	\$132,700	100%	13	960
14		M	10/09		\$139,000	\$150,100	108%	21	Outliers
15		M	09/09		\$125,000	\$140,100	112%	25	
Totals:					\$2,200,000	\$1,886,700		183	
Weighted Average Ratio:					86% (1,886,700/2,200,000)				
Average Ratio:					87% (960/11)				
Average Deviation:					12.2% (183/15)				
Quality Rating:					14 (12.2/87)				

Answers to Class Problems – Chapter 7

Problem 7.3 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	04/09		\$269,000	\$161,400	60%	27	
2		R	02/09		\$174,500	\$118,700	68%	19	Outliers
3		R	03/09		\$232,500	\$165,100	71%	16	
4		R	02/09		\$199,000	\$143,300	72%	15	
5	1	R	09/09		\$145,000	\$107,300	74%	13	
6	2	R	08/09		\$205,000	\$157,800	77%	10	
7	3	R	01/09		\$158,900	\$122,400	77%	10	
8	4	R	05/09		\$215,000	\$174,200	81%	6	
9	5	R	09/09		\$178,000	\$146,000	82%	5	
10	6	R	11/09		\$209,900	\$176,300	84%	3	
11	7	R	03/09		\$150,000	\$126,000	84%	3	
12	8	R	04/09		\$167,500	\$142,400	85%	2	
13	9	R	04/09		\$239,000	\$207,900	87%	0	Mean
14	10	R	10/09		\$244,000	\$219,600	90%	3	87%
15	11	R	03/09		\$177,700	\$159,900	90%	3	
16	12	R	02/09		\$180,000	\$163,800	91%	4	
17	13	R	07/09		\$224,500	\$206,500	92%	5	
18	14	R	10/09		\$149,000	\$140,000	94%	7	
19	15	R	01/09		\$192,500	\$182,900	95%	8	
20	16	R	05/09		\$136,500	\$129,700	95%	8	
21	17	R	08/09		\$188,000	\$184,200	98%	11	1476
22		R	07/09		\$184,500	\$188,200	102%	15	
23		R	12/09		\$156,600	\$164,400	105%	18	Outliers
24		R	08/09		\$125,000	\$137,500	110%	23	
25		R	12/09		\$149,000	\$177,300	119%	32	
Totals:					\$4,650,600	\$4,002,800		266	
Weighted Average Ratio:				86% (4,002,800/4,650,600)					
Average Ratio:				87% (1476/17)					
Average Deviation:				10.6 (266/25)					
Quality Rating:				12 (10.6/87)					

Answers to Class Problems – Chapter 7

Problem 7.4 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		L	12/09		\$48,900	\$22,000	45%	23	
2		L	04/09		\$46,000	\$22,100	48%	20	
3		L	03/09		\$39,700	\$19,500	49%	19	Outliers
4		R	09/09		\$315,500	\$167,200	53%	15	
5		L	06/09		\$65,000	\$35,800	55%	13	
6		R	11/09		\$258,000	\$149,600	58%	10	
7	1	L	09/09		\$40,000	\$24,000	60%	8	
8	2	L	10/09		\$49,000	\$29,900	61%	7	
9	3	L	02/09		\$52,000	\$32,200	62%	6	
10	4	R	02/09		\$226,500	\$140,400	62%	6	
11	5	R	05/09		\$278,900	\$175,700	63%	5	
12	6	R	12/09		\$198,000	\$126,700	64%	4	
13	7	L	09/09		\$45,000	\$28,800	64%	4	
14	8	R	08/09		\$269,000	\$172,200	64%	4	
15	9	R	02/09		\$205,000	\$133,000	65%	3	
16	10	L	05/09		\$34,500	\$22,400	65%	3	
17	11	R	05/09		\$188,000	\$124,000	66%	2	
18	12	R	04/09		\$322,000	\$212,500	66%	2	
19	13	L	07/09		\$43,000	\$28,500	66%	2	
20	14	L	07/09		\$38,000	\$25,800	68%	0	Mean
21	15	R	06/09		\$164,500	\$111,900	68%	0	68%
22	16	L	08/09		\$42,000	\$28,600	68%	0	
23	17	R	11/09		\$305,000	\$210,500	69%	1	
24	18	R	02/09		\$139,000	\$97,000	70%	2	
25	19	R	01/09		\$297,500	\$208,200	70%	2	
26	20	R	10/09		\$162,500	\$115,400	71%	3	
27	21	R	03/09		\$292,000	\$210,200	72%	4	
28	22	L	06/09		\$32,500	\$23,400	72%	4	
29	23	R	08/09		\$178,000	\$131,700	74%	6	
30	24	L	04/09		\$37,000	\$27,700	75%	7	
31	25	L	03/09		\$34,900	\$26,500	76%	8	
32	26	R	01/09		\$195,000	\$150,000	77%	9	1758
33		R	05/09		\$270,000	\$207,900	77%	9	
34		R	12/09		\$284,900	\$222,200	78%	10	
35		R	08/09		\$136,000	\$108,800	80%	12	Outliers
36		R	11/09		\$265,000	\$225,200	85%	17	
37		R	03/09		\$142,500	\$128,300	90%	22	
38		R	09/09		\$162,000	\$153,900	95%	27	
Totals:					\$5,902,300	\$4,079,700		299	
Weighted Average Ratio:			69% (4,079,700/5,902,300)				CLASSIFICATIONS		
Average Ratio:			68% (1758/26)				L=LAND		
Average Deviation:			7.9 (299/38)				M=CONDO		
Quality Rating:			12 (7.9/68)				R=RESIDENTIAL		
							W=WATERFRONT		

Answers to Class Problems – Chapter 7

Problem 7.5 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		L	12/09		\$48,900	\$22,000	45%	18	Outliers
2		L	04/09		\$46,000	\$22,100	48%	15	
3	1	L	03/09		\$39,700	\$19,500	49%	14	
4	2	L	06/09		\$65,000	\$35,800	55%	8	
5	3	L	09/09		\$40,000	\$24,000	60%	3	
6	4	L	10/09		\$49,000	\$29,900	61%	2	
7	5	L	02/09		\$52,000	\$32,200	62%	1	Mean
8	6	L	09/09		\$45,000	\$28,800	64%	1	63%
9	7	L	05/09		\$34,500	\$22,400	65%	2	
10	8	L	07/09		\$43,000	\$28,500	66%	3	
11	9	L	07/09		\$38,000	\$25,800	68%	5	
12	10	L	08/09		\$42,000	\$28,600	68%	5	
13	11	L	06/09		\$32,500	\$23,400	72%	9	690
14		L	04/09		\$37,000	\$27,700	75%	12	Outliers
15		L	03/09		\$34,900	\$26,500	76%	13	
				Totals	\$647,500	\$397,200		111	
Weighted Average Ratio:				61% (397,200/647,500)					
Average Ratio:				63% (690/11)					
Average Deviation:				7.3 (110/15)					
Quality Rating:				12 (7.3/63)					

Answers to Class Problems – Chapter 7

Problem 7.6 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	09/09		\$315,500	\$167,200	53%	17	
2		R	11/09		\$258,000	\$149,600	58%	12	Outliers
3		R	02/09		\$226,500	\$140,400	62%	8	
4	1	R	05/09		\$278,900	\$175,700	63%	7	
5	2	R	12/09		\$198,000	\$126,700	64%	6	
6	3	R	08/09		\$269,000	\$172,200	64%	6	
7	4	R	02/09		\$205,000	\$133,000	65%	5	
8	5	R	05/09		\$188,000	\$124,000	66%	4	
9	6	R	04/09		\$322,000	\$212,500	66%	4	
10	7	R	06/09		\$164,500	\$111,900	68%	2	
11	8	R	11/09		\$305,000	\$210,500	69%	1	
12	9	R	02/09		\$139,000	\$97,000	70%	0	Mean
13	10	R	01/09		\$297,500	\$208,200	70%	0	70%
14	11	R	10/09		\$162,500	\$115,400	71%	1	
15	12	R	03/09		\$292,000	\$210,200	72%	2	
16	13	R	08/09		\$178,000	\$131,700	74%	4	
17	14	R	01/09		\$195,000	\$150,000	77%	7	
18	15	R	05/09		\$270,000	\$207,900	77%	7	
19	16	R	12/09		\$284,900	\$222,200	78%	8	
20	17	R	08/09		\$136,000	\$108,800	80%	10	1194
21		R	11/09		\$265,000	\$225,200	85%	15	
22		R	03/09		\$142,500	\$128,300	90%	20	Outliers
23		R	09/09		\$162,000	\$153,900	95%	25	
				Totals	\$5,254,800	\$3,682,500		171	
Weighted Average Ratio:				70% (3,682,500/5,254,800)					
Average Ratio:				70% (1194/17)					
Average Deviation:				7.4 (171/23)					
Quality Rating:				11 (7.4/70)					

Answers to Class Problems – Chapter 7

Problem 7.7 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		W	06/09		\$427,500	\$171,000	40%	23	
2		W	07/09		\$376,000	\$150,400	40%	23	
3		R	03/09		\$259,000	\$106,200	41%	22	Outliers
4		W	11/09		\$419,000	\$175,900	42%	21	
5		R	10/09		\$249,000	\$109,600	44%	19	
6	1	W	02/09		\$400,000	\$180,100	45%	18	
7	2	W	05/09		\$365,000	\$171,500	47%	16	
8	3	R	05/09		\$245,000	\$117,600	48%	15	
9	4	W	04/09		\$395,000	\$189,600	48%	15	
10	5	R	10/09		\$222,500	\$111,300	50%	13	
11	6	W	09/09		\$399,000	\$203,500	51%	12	
12	7	W	02/09		\$445,000	\$235,800	53%	10	
13	8	W	12/09		\$386,900	\$212,800	55%	8	
14	9	W	04/09		\$355,000	\$195,200	55%	8	
15	10	W	07/09		\$349,000	\$198,900	57%	6	
16	11	R	06/09		\$214,500	\$128,700	60%	3	
17	12	W	11/09		\$389,000	\$241,200	62%	1	
18	13	W	12/09		\$345,500	\$214,200	62%	1	Mean
19	14	R	03/09		\$188,000	\$122,200	65%	2	63%
20	15	W	02/09		\$375,000	\$243,700	65%	2	
21	16	R	06/09		\$139,000	\$94,500	68%	5	
22	17	W	06/09		\$333,000	\$229,800	69%	6	
23	18	R	04/09		\$177,900	\$124,500	70%	7	
24	19	R	08/09		\$227,000	\$163,400	72%	9	
25	20	R	10/09		\$199,000	\$149,200	75%	12	
26	21	R	07/09		\$195,000	\$154,000	79%	16	
27	22	R	05/09		\$134,500	\$110,300	82%	19	
28	23	R	04/09		\$250,000	\$210,000	84%	21	
29	24	R	06/09		\$148,000	\$125,800	85%	22	1507
30		R	12/09		\$164,500	\$141,500	86%	23	
31		R	09/09		\$132,000	\$116,200	88%	25	
32		R	11/09		\$129,000	\$117,400	91%	28	Outliers
33		R	07/09		\$142,500	\$131,100	92%	29	
34		R	04/09		\$130,000	\$123,500	95%	32	
				Totals	\$9,306,300	\$5,470,600		492	
Weighted Average Ratio:			59% (5,470,600/9,306,300)						
Average Ratio:			63% (1507/24)						
Average Deviation:			14.5 (492/34)						
Quality Rating:			23 (14.5/63)						

Answers to Class Problems – Chapter 7

Problem 7.8 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		R	03/09		\$259,000	\$106,200	41%	33	
2		R	10/09		\$249,000	\$109,600	44%	30	Outliers
3		R	05/09		\$245,000	\$117,600	48%	26	
4	1	R	10/09		\$222,500	\$111,300	50%	24	
5	2	R	06/09		\$214,500	\$128,700	60%	14	
6	3	R	03/09		\$188,000	\$122,200	65%	9	
7	4	R	06/09		\$139,000	\$94,500	68%	6	
8	5	R	04/09		\$177,900	\$124,500	70%	4	
9	6	R	08/09		\$227,000	\$163,400	72%	2	Mean
10	7	R	10/09		\$199,000	\$149,200	75%	1	74%
11	8	R	07/09		\$195,000	\$154,000	79%	5	
12	9	R	05/09		\$134,500	\$110,300	82%	8	
13	10	R	04/09		\$250,000	\$210,000	84%	10	
14	11	R	06/09		\$148,000	\$125,800	85%	11	
15	12	R	12/09		\$164,500	\$141,500	86%	12	
16	13	R	09/09		\$132,000	\$116,200	88%	14	964
17		R	11/09		\$129,000	\$117,400	91%	17	
18		R	07/09		\$142,500	\$131,100	92%	18	Outliers
19		R	04/09		\$130,000	\$123,500	95%	21	
				Totals:	\$3,546,400	\$2,457,000		265	
Weighted Average Ratio:			69% (2,457,000/3,546,400)						
Average Ratio:			74% (964/13)						
Average Deviation:			14 (265/19)						
Quality Rating:			19 (14/74)						

Answers to Class Problems – Chapter 7

Problem 7.9 solutions

ITEM NO.		CLASS	MO/YR		SALE PRICE	ASSESSMENT	RATIO	DEV.	
1		W	06/09		\$427,500	\$171,000	40%	12	Outliers
2		W	07/09		\$376,000	\$150,400	40%	12	
3	1	W	11/09		\$419,000	\$175,900	42%	10	
4	2	W	02/09		\$400,000	\$180,100	45%	7	
5	3	W	05/09		\$365,000	\$171,500	47%	5	
6	4	W	04/09		\$395,000	\$189,600	48%	4	
7	5	W	09/09		\$399,000	\$203,500	51%	1	Mean
8	6	W	02/09		\$445,000	\$235,800	53%	1	52%
9	7	W	04/09		\$355,000	\$195,200	55%	3	
10	8	W	12/09		\$386,900	\$212,800	55%	3	
11	9	W	07/09		\$349,000	\$198,900	57%	5	
12	10	W	12/09		\$345,500	\$214,200	62%	10	
13	11	W	11/09		\$389,000	\$241,200	62%	10	577
14		W	02/09		\$375,000	\$243,700	65%	13	Outliers
15		W	06/09		\$333,000	\$229,800	69%	17	
				Total	\$5,759,900	\$3,013,600		113	
Weighted Average Ratio:				52% (3,013,600/5,759,900)					
Average Ratio:				52% (577/11)					
Average Deviation:				7.5 (113/15)					
Quality Rating:				14 (7.5/52)					